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Experiments

AND

NOTES

About the

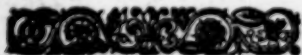
PRODUCIBLENESS

OF

Chymicall Principles ;

Being Parts of an Appendix, design'd
to be added to the *SCPTICAL*
CHYMIST.

By the Authour of that Booke.



OXFORD;

Printed by *H. Hall* for *Ric. Davis*. 1680.



The Authors Preface.



Having long since observ'd, that a great part of the erroneous Reasonings and Conclusions of Learned Men, as well about Physicall, as other Subjects, proceeds not so much from their making bad illations, as from their assuming false or uncertaine Principles, to draw their consequences from: I thought, I could scarce mispend the time I allow'd my selfe for Chymicall Studies, if I employ'd some part of it, in examining the Doctrine about the Principles of Natural Bodies. Upon this account I did, in the year 1661. venture abroad my Scepticall Chymist, to acquaint the inquisitive with my doubts, and excite them, to a more thorow disquisition of a subject, so considerable, as well to Natural Philosophy, as to Physick. This discourse being once published in English, and soone after in Latine: I thought

The Authors Preface.

fit to wait a while, that I might learn what Judgement would be made of it, and whether any of the Chymists would return an answer to it, and in the mean while, to gratifie those that appear'd desirous of having it soon reprinted, I gathered divers Notes, (some of them considerable for bulk) to be inserted here and there, as enlargements in the next Edition, whose volume I was not unwilling somewhat to encrease, not only because I thought Truth in general, a thing worthy that the lovers of it should take pains to discover, and establish it, but because, I look'd upon the truth enquired after, in the Scepticall Chymist, as of no mean importance, especially since the mistakes that very many have made about it, have I fear, not only been prejudicial to Natural Philosophy, but have, by severall Men, as well Learned as Ignorant, been adopted both into the speculations, and practise of Physitians; whose Art being conversant about the Health and Life of Man, Doctrinal errors in it, cannot but be dangerous, and therefore fit, as much as is possible, to be solicitously avoided, or remov'd. These inconveniencies I hop'd

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might

The Authors Preface.

might in some measure be obviated; if it were further made appear by Experiments as well as Reasonings, that the vulgar doctrine of the *Tria Prima* is at least very questionable, or uncertaine and very narrow. For the contrary persuasions, about these Principles, has misled divers Learned Men to give, and take up with precarious and superficial accounts of divers *Phænomena* of Nature, by which means they have been diverted from employing their Wits (wherein divers of them are happy) in the investigation of the true and fundamentall causes, the discovery whereof, would have enabled them, instead of dark and superficial, to give intelligible and particular explications of those *Phænomena*, and many others. The difference between the accounts given of the same *Phænomena*, by the *Hypoſtatical*, and by the *Mechanical* Principles, may be seen exemplified, by particular instances in other Papers; Wherefore I shall proceed to observe as to *Physick*, that besides the mistakes which I doubt, divers Learned Men have by another valuation of the Doctrine of the *Tria prima*, been led into, in relation to the causes of divers things that occur to humane Bodies, and even in
Chemical

The Authors Preface.

Chymical operations; besides this I say, I fear that the too confident opinion of the Doctrine I question has made divers practitioners of Physick, make wrong estimates of Medicines. But after I had waited a competent time, I perceiv'd no Author vouchsaf'd the Scepticall Chymist an answer; but a very Ingenious Man, from whom I chiefly expected it, told me, that he had indeed design'd to write one, but was hindered by considering, that I had so stated the case, that an answer could not confute that Book, by any meer Justification of the Chymists Principles, since he would be obliged also to defend the Chymical Doctrine as 'tis generally taught by the vulgar Chymists; and make good the Arguments by which they are wont to maintaine it. Since 'tis only that Doctrine and these Arguments, that I declare my self in that discourse to question; and he himself did not think them sound and valid. By these encouragements, I was induced to comply with the earnest solicitations of the Printer, for another Edition, but he dying soon after, and the Person to whom the right to dispose of the English Copy, legally came, having

The Authors Preface.

left England, and continued out of it, for divers Tears, the dispute between the Stationers that pretended to it, and treated about it, lasted so long, that a Traveller who passed this way told an acquaintance of mine, that he had then (which was two or three years agoe) seen nine severall Latine impressions of it, since when, another has been brought me made at Geneva. This number of Editions (in none of which I have added or altered a Word) and the numerous citations I have mett with of it, in favourable Writers, made me unwilling to confound, or trouble, Readers by interweaving Additional Notes, with the Body of the Discourse; and so by obliging those that should hereafter Vouchsafe to mention any of the inserted passages of it, to cite the Edition as well as the Book. And therefore I was easily inclin'd, by want of Health and Leasure, to peruse againe deliberately the whole Treatise, to suppress all those Notes, that I could not readily and conveniently refer to three or four of the chief heads, I intended to enlarge upon, and without altering the forme of the Book wherein it has prov'd so fortunate to leave it intire,
and

The Authors' Preface.

and publish my Additions also by themselves by way of Appendix. This in my Intention was to consist of four heads, The Producibleness of Chymicall Principles, The uncertainty of the vulgar Analyses made by distillation. The various effects of the fire according to the differing waies of employing it. And doubts whether there be any Elements, or material Principles of mixt Bodies, one or more in the sense vulgarly received. But finding by the Stationers estimate, that the notes refer'd to the three last Titles, are not near so large as those that belong to the first; yet they would make the book to which they should be added, and which is already printed, of too great a thickness in proportion to its other dimensions, I thought fitt to reserve the other papers for another opportunity, and at this time annex nothing, but what concerns the Producibleness of Chymical Principles.

But yet because there are some generall Advertisements that do somewhat more belong to this part of our design'd Appendix that now comes forth, than to any of the rest, I must not deny them

The Authors Preface.

a roome in this Preface, which I shall conclude with them.

*I might justly enough alledg, in excuse of incoherence of some of the particulars that follow next after one another in the subsequent discourse, that this being confusedly but a Collection (or if you please a Rhapsody) of loose Notes, 'tis more pardonable, than strange, that some of them should want apt connections, and the stile of the discourse they compose should want uniformity. But 'tis not so much my present Work to make Apologies, as to give Advertisements, and therefore I shall proceed to tell you in the first place, that though the following discourse have in some places a somewhat Dogmaticall dress, yet it is cheifely meant (as becomes an Appendix to a Sceptical Book) to excite and assist a further inquiry, and accordingly the reader may perceive it to have been my care, not so much to play the part of a Logical Opponent, as to take occasion to sett down variety of experiments and observations, that whatever Hypothesis about the Material principles of mixt Body's shall prove fitt to be pitch'd upon, it may be founded
on*

The Authors Preface.

on a less insufficient History of matters of fact (relating to that subject) that Chymists have been wont to take in; and may be so framed, as not to be lyable to those objections and difficulties, that will be here mett with, and yet perhaps were not thought of, or at least were not duely taken into consideration, when the vulgar Hypothesis of the Triaprime was establisht. Upon this account I am not without hope, that the following experiments and considerations, though propos'd by way of objections, may do some service to the inquirers into the material Principles of things; by obliging the Chymists, at least, to reforme their doctrine about them, and build it more cautiously, and that upon a larger, as well as more solid foundation of Natural History.

The second thing whereof I am to advertise the Reader, is that I would not have him infer from any thing that (prompted by the exigencies of my design) I have said in the following papers, that I either do undervalue, or would decry Chymistry, or Chymists themselves indiscriminately. For I have a very differing

The Authors Preface.

differing esteem of the Notionall and of the Practicall part of Chymistry. For divers of the opinions maintain'd by Spagirists, without excepting their grand Hypothesis of the three Principles, I have been inclin'd to question not only as a Naturalist, but as a Chymist; as seeing great cause to doubt whether they be agreeable, either to the true grounds of Philosophy, or the exploring Experiments of the fire. But as for Chymical operations, such as Distillation, Solution, Sublimation, Precipitation, and the rest; especially those seldome sufficiently valued ones, Digestion and Cohobation, I take them to be excellent tools in the Hands of a Naturall Philosopher, and to be by him applicable to many other, and perhaps some nobler uses than they are wont to be put to, in Laboratories; since if they be skilfully employ'd they may be successessfully so, as well to discover Nature, as to correct, to imitate, and in some cases to outdo her. Nor do I only thus distinguish between the speculative and operative part of Chymistry, but I make a great difference between the avow'd Cultivators of that Art; and look not with the same eyes on the opinions
and

The Authors Preface.

and performances of vulgar Chymists, and Chymical Philosophers. For we are told that there lives conceal'd in the world, a set of Spagyristes of a much higher order than those that are wont to Write courses of Chymistry or other Bookes of that nature; being able to transmute baser Metalls into perfect ones, and do some other things, that the generality of Chymists confess to be extreamly difficult; and divers of the more judicious even among the Spagyristes themselves have judg'd impossible. The declaration of what I thinke of these latent Philosophers belongs to another paper. Yet in this I shall not deny but that what I have heard from divers very credible eye-witnesses, and perhaps some more immediate arguments, strongly incline me to thinke that there may have been, and may yet be, some such men, and whatever be to be thought of what they call the Philosophers Stone, I confess my self convinc'd by what I have seen, that there are in the World as difficult Arcana as divers of those which have been (perhaps not all of them justly) derided under the name of Chymicall non-entia. Now if there be really such adept Philosophers

The Authors, Preface:

as we are told of; I am apt to thinke that among their other Arcana they are Masters of extreemly potent *Menstruums* (which may, as far as I can guess, be some of their cheifest Toolles) and may by the help of these and other means peculiar to themselves, of working upon bodys, be able to produce in them, such alterations, as we have no examples of, and so obtain from them such similar substances, as either for number, or quality, or both, may be very different from the vulgar *Tria Prima*, or those substances Chymists are wont to obtaine, (for that word I chuse to employ rather than the word *separate* or *Extract*) by the common ways of what they call *Analysis*. For if a Man have an instrument which other men have not, and much more, if it be an excellent one, he may be able with it to performe other things, than they can without it. The Europeans by the helpe of so slight an Engine as a Mill assisted by a far slighter instrument a seive can easily divide Corne into Bran and Meal and Flour, which even those Americans, for want of those helpes, were not able to do, who could do other things that are thought far more difficult. And he that has a file and a good turning lath with

The Authors Preface.

with its appurtenances, may obtain from a piece of iron both filings and shavings and concave Hemispheres and ellipses and Globes and Cylinders and other sorts of bodies, which could not be obtain'd from that Iron even by good artificers that were not furnish'd (as till of late very few were) with those instruments. And he that first found the use of Aqua Fortis in dissolving Silver, and that though it were mixt with Gold, had by his Menstruum an easy way of separating those two Metalls, though ancient Mineralists, Nor Chymists themselves had no liquor that would performe that worke. But Helmonts writings will supply me with a far nobler instance to my present purpose, if the truth of all that he delivers concerning the effects of his Alkahest be admitted, About the possibility of which strange solvent having elsewhere written a short enquiry, I shall forbear to say any thing of it here, but rather intimate that if there be such adept Philosophers as some speak of (which I thinke not Incredible) and if they have (which supposing there be such I think not unlikely) among other rare things some Alkahestical or other extraordinarily potent Menstruum, or way of penetrating and working upon mixt bodies; they may for ought I know be able to obtaine such substances from them, as may induce me, and perhaps the Chymists too, to entertaine other thoughts about the constitution of compounded bodies (as they are wont to be call'd) than either I or they now have. And therefore though as to Naturall Philosophy in generall I do not expect to see any Principles propos'd more comprehensiv and intelligible than the Corpuscularian or Mechanical;

The Authors Preface.

cal; yet as to the subordinate Theory of mixt bodies in particular, I that have disputed only against the vulgar Hypothesis of the Chymists, can easily retain a disposition to receive further light in this matter, when those that are the best able to afford it us, and from whom it will be no disparagement for much greater proficients than I, to learn, shall think fit to oblige us by doing so. In the mean time, to end this advertisement as I begun it; I should not need to say much to satisfy Chymists that I neither hate nor despise their Art, even in its present state, if some things and chiefly want of leisure, would permit me to publish an essay that I wrote many Years since, Of the usefulness of Chymistry to the Empire of Man. Nor is it only to the practical part of Natural Philosophy that I take Chymistry as it may be manag'd, to be highly usefull, but I confess I thinke also that being ordered by a skilfull Naturalist, it may far more conduce, than those that are strangers to it are wont to think, to the speculative part of Physicks; and that as the Boleonian Stone without being Chymically prepar'd would never be made Luminous, but being so prepar'd is brought to shine, so many other Natural bodies never afford much light to Philosophy, till Chymicall operations have qualified them to do so.

The Last advertisement I desire to give the Reader concernes the intention with which I call in question the Hypothesis of the Tria Prima and some other of the Chymists Doctrines. For though sometimes I have had occasion to discourse like a Scepticke, yet I am far from being one of that sect; which I take to have been little
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The Authors Preface.

less prejudicial to naturall Philosophy than to Divinity itselfe. I do not with the true Scepticks propose doubts to perswade Men that all things are doubtfull and will ever remaine so, (at least) to humane understandings, but I propose doubts not only with designe, but with hope, of being at length freed from them by the attainement of undoubted truth; which I seek that I may find it; though if I miss of it in one opinion I proceed to search after it in the opposite or in any other where it seems more likely I should meet with it. And to declare my mind to the disciples of the fire, by a similitude not alien from their profession: suppose a Man more rich than skillfull should Bequeath me a purse of Guineys, and that I should have strong presumptions that some of them are counterfeited, what in this case would a Chymist have me do? To take them all for good in spite of contrary presumptions against some of them, were very imprudent. On the other side to throw them all away because tis probable some may prove counterfeit, were downright folly. That then which common prudence would direct me would be to take them all out and examine them one by one, first with the touch-stone, and then, if need be, by the Cupell and by Aqua Fortis too: and this I should do with desire to find all the peices true, having also care not only to preserve and put back into the Purse, those that prove right; but if any be but partly adulterated, to preserve the good portion by purifying it, (by the Cupel or some other fit way) from the falsifying alloy by whose admixture it had been imbas'd. The application of this I leave to be made by Chymists. And having in another paper purposely discours'd of the cautions and limitations

The Authors Preface.

imitations without which I disallow Scepticisme, I shall only in generall profess that I more willingly embrace the truths taught by the Chymists, than I endeavour to disprove their errors. For I looke upon truth as one of the cheife of those goods that God has of all others laid the most in common; since truth does not only, like desert Islands in America, belong to him that first finds it and seises on it; but even when another has lighted on it and is in possession of it, any Man may without trespass or injury, make himselfe a sharer in it. To conclude; I am glad to find truth in the Doctrines of the chymists: but when I cannot discern it there, I chuse rather to seek it elsewhere than sit down without it. And if I any where seem to be somewhat too indulgent to suspitions against their Hypothesis, or arguments, I hope the usuall confidence to be mett with among most of them, consider'd; will be look'd upon but as a compliance with the advise of Aristotle of bending a crooked stick the contrary way to reduce it at length to straitness. And I did with the less scruple allow my selfe this way of writing, because experience having taught me that some spagirists (for I speak not of all) that keep their best things close, will do more to Vindicate their art, or oppose their antagonists, than to gratifie the curious or benefit Mankind, I thought the rousing stile I sometimes wrote in, might prove no unhopfull way to procure somewhat considerable from those great Masters, and orders of Chymicall Arcana, that must be provok'd before they will come out with them; as the sea is observ'd not to give us one of its preciousst treasures, Amber-greece; till it have been agitated by winds and stormes.



The Publisher's Adver-
tisement to the
R E A D E R.

I Shall not entertaine the Reader with any thoughts of my own, about the following Appendix, which, without desiring to prepossess him, I shall willingly (and I thinke may safely) leave to speak for it selfe. But yet I think it may not be amiss, if I premise something to the Reader, about the publication of these Notes, as having been particularly concern'd in it.

By the opportunity I had of seeing some papers, of the Honourable Author of the ensuing Appendix;

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The Advertisement.

I perceived that the Notes which be design'd it should consist of, were indeed most of them laid together in some (though but a careless) order, and so were without much difficulty fitted for the Press: but others of them lay scatter'd up and down amongst many others, about differing Subjects in his Philosophical Memorials, which particulars not being ready at hand, when the Ensuing Notes were sent to Oxford to the Printer, they could not be publish'd with the rest, but must expect some other opportunity, to appear abroad, either alone; or in their company.

Perhaps the Reader will not need to be told that besides the Application of some of the Experiments contained in the following Notes, most of the Experiments themselves are new. But so many years are past,
betwixt

The Advertisement.

betwixt the first Edition of the Sceptical Chymist, and the second that now comes forth; that it may be requisite (though otherwise it would be improper) to advertise this Reader, that he is not to think, that the Author has borrowed from others those Experiments and Notions, that may be met with in Bookes written in later years, as well as in the Sceptical Chymist. For the first English Edition having been put forth in the year 1661. and never since by the Author at all enlarg'd, or alter'd; 'twill sufficiently shew that this Book could not borrow from those that never were seen till after, and perhaps long after his was published. Which Advertisement may be particularly apply'd to the late Learned Treatise, Intituled Philolophia Vetus & Nova, wherein in one long Chapter may be

The Advertisement.

met with an Abridgment of a great part of the Notions, Experiments and Ratiocinations of the Sceptical Chymist, without any mention there made, either of the great and famous Authors Name, or his Book in which they first appear; Though the Latine Version of that Treatise, was publish'd many years ago, and reprinted many times since. And though thus be not the only VVriter, that hath thought fit to make use of considerable portions of the Scepticall Chymist, without owning it, I thought, what he has been pleas'd to do, required to have particular Notice taken of it: because, though his modesty hath perswaded him to conceal his Name, his Learned Book hath made him so justly famous, that if the Reade were not advertis'd, he might easily suspect, that Mr Boyle had not lent to, but borrow-

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The Advertisement.

ed of an Author, who appears so capable of enriching the Curious with excellent things of his own. And upon the same grounds I thinke it necessary to observe, that the Experiments to be met with in Mr. Boyles Histoy of Colours, having been publish'd many years ago, could not be borrow'd from that most ingenious Treatise, though in that Chapter of it which treats de coloribus, between 20. and 30. Experiments, (If I misremember not the number) will be found the same with the like Number of Mr. Boyles; whose Name, though elsewhere very civilly taken notice of on some other occasion, is in that whole Chapter left unmention'd.

I might here informe the Reader, that the Sceptical Chymist having been many years out of Print, it chanc'd that when the
Notes,

The Advertisement.

Notes, that make up the following Appendix, were drawn together for the Press, this Author had not a Book at hand, by comparing whereof with the particulars of his design'd Appendix, he might be sure to avoid, (what he now but hopes he hath;) the suffering any thing to passe in the latter, that is truly coincident, with what was already extant in the former: (I mean, to the same purpose, and on the same occasion; for otherwise an Experiment or Notion may be more then once employ'd without meer Repetition.)

And lastly I dare not omitt to let the Reader know, that since the Appendix was printed, it appears, that by an oversight, some leaves were left behind; that treating of the difference of Common Mercury's themselves, should have been annex'd, as a kind of Appendix, to the last of the
three

The Advertisement.

*three Mercurial Tracts, to be met
with among the following papers :
from whose perusal the Reader shall
no longer be detain'd by*

His

Humble Servant

I. M.

THE LIBRARY

OF THE

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OF THE

UNITED STATES

OF AMERICA

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may be compounded: and so men may acquaint themselves with the nature of a multitude of bodies, by first knowing the nature but of a few. He therefore that acknowledges he does not acquiesce in the Chymicall Hypothesis of the *Tria Prima*, or their's that add to them *Water* and *Earth*, can scarce employ a more proper Argument to shake it, than, upon good ground to call in question what they teach when they affirme That their Principles are ingenerable and incorruptible, and that Nature does only compound and dissociate them, without either producing or destroying any of them. It will be therefore very well worth while to examine, what evidence there is in an Assertion, which, in so many of the Chymists Reasonings and explications is either manifestly imploy'd or not obscurely suppos'd. And indeed this Tenent of theirs is so principall a Pillar of their Hypothesis, that, in case it faile them the whole structure will be in danger of ruine. For if the Bodies they call Principles be produc'd *de Novo*, how will it be demonstrable

demonstrable that Nature was oblig'd to take those Principles made ready to her hand when she was to compound a mixt-body, and how will it appeare in every *Analysis* made by fire, that the Salt (for instance) thereby obtain'd was not produc'd by the Chymicall operations, but was preexistent in the body in minute parts, which by the action of the fire were only extricated and separated from the other Principles or Ingredients, and afterwards brought together: since in case the Chymical supposition be erroneous, not only the obtained Salt may be in part due to a new Production or Transmutation, but part of that which was really salt, if any such thing there were antecedently to the *Analysis*, might be either destroyed by the operation, or made to appear under some other forme.

commonly is that Nature was obliged
 to take the Principles made ready
 to her hand when she was to form
 round a new body, and how will
 it appear to every body made by
 fire, the Salt (the substance)
 thereby composed was not really
 the Chymical compound, but was
 preexisting in the body in minute
 parts which by the force of the fire
 were cohered together, and
 from the force of Principles of Nature
 thus, and otherwise, they are together
 fixed in the Chymical composition
 he extracted, not out of the compound
 Salt, but out of a part due to it, and
 Production of the compound, but
 part of it which was really fixed
 any such thing there was unnecessary
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OF THE
PRODUCIBLENESS

Of CHYMICALL Principles.

The first Part.

Of the Producibleness of Salt.



Mong the substances upon which Chymists have conferr'd the Title of Principles, *Salt* seems in their estimate to have had the Precedency, since they are wont to name it first in the enumeration of their *Trita Prima*. And 'tis generally granted, that *Salts* are wont to be the most considerable and active parts obtain'd by Chymists from mixt bodies. And yet perhaps the

the invisible particles that compose the visible portions of a Salt may be such, and so construed, as to be fit to make and to have perhaps actually made other portions of matter endowed with those Qualities, for which Chymists are wont to call a body sulphureous or mercurial, as may be instanced in the *Inflammability* of *Nitre*. Wherefore it may deserve a greater measure of curiosity, than seems to have been employed or even design'd by vulgar Chymists, to enquire, whether *Salt* indefinitely speaking, may be produc'd *de Novo* (as they phrase it) or destroyed; and whether at least the particular, and much differing, *Species* of Salts may be changed into one another, and thereby after a manner be produc'd in reference to the acquired *Species* of Salt, and destroy'd in relation to that which the same portion of matter belong'd to before.

To premise somewhat in general to render it probable that *Salts* may be produc'd *de Novo*, I shall briefly represent two things: The first is, that since *Salts* differ much in severall of

of Chymical Principles.

ther attributes, some being *fixt*, some *volatile*, some *Acid*, some *Urinous* &c. the two qualities wherein they agree, and which therefore make up the common and most received Notion of *Salt* in generall, are, that it is easily dissoluble in water and that it affects the Palat with a sapor, whether good or evill: and the other thing, is, that whether we allow the *Epicurean* Hypothesis or the *Cartesian*; the first Saline Concretions that were produc'd by Nature must be confess'd to have been made of Atomes, or of Particles, that before their conjunction, were not Saline, and therefore there appears no absurdity in conceiving that by the action of the fire or other fit Agents, small portions of matter may be so broken into minure parts, and these fragments may be so shap'd and connected, as, when they are duely associated, to compose a Body capable of being dissolved in water, and of affecting the organs of Taste.

That a Disposition to be dissoluble in this or that liquor may be acquir'd by mixture and the new Texture

ture of parts, is not without example, for as I elsewhere observe, though powder'd sulphur will lye in well rectified spirit of wine, some Weekes or Months, without being at all visibly dissolv'd in it, and though the same liquor will for as long a time swim upon Salt of *Tartar* without making a solution of it; yet if this Salt and Sulphur be mixt together, spirit of Wine will in less than an hour and sometimes in less than a quarter of that time dissolve enough of this matter to be richly colour'd by it, and this without the help of external heat. And I see not, why it should be impossible that the action of the fire, may reduce the Corpuscles of bodies to such a minuteness, and associate them either among themselves or with the Corpuscles of other Bodies which without preparation will not dissolve in water, that the pores intercepted between them may be enter'd & their loose Texture dissolv'd by that *Mensstruum*. Of which Conjecture though we have not a perfect instance, yet we have a Probable one in that which I shall hereafter

after deliver concerning the making of Fixt Nitre. For though the Chry-
stalls of well purified Salt peter
may be kept many weekes or months
in an ordinary Lodging chamber (for
I had not occasion to try it in a
cellar) without relenting by the moi-
sture of the Air; yet if without the ad-
dition of any body dissoluble in water
or moist aire it be in great part re-
duced, as perhaps it may be almost
in a trice, to a fixt *Alkali*, this Salt will
be easily enough penetrable by the
vapours that rove up and downe in
the Aire, and will by that moisture,
in no long time, be brought to re-
lent, and at length will be resolved into
a liquor very Analagous to that which
the Chymists make of Salt of *Tartar*
left in moist Cellars to deliquate.

As for the *Sapor*, which is the
second Qualification to be considered
in the vulgar Notion of a Saline body,
I doubt, whether the necessity of it
be agreeable to another Principle of
theirs, and to experience. For 'tis
plaine that chymicall oyles, even those
pure ones that they call *Essentiall*, or
even *Ethereal* ones, are highly sapid:

6 *Of the Producibleness*

and yet, these not dissolving in water, it seems there is no strict connection betwixt being saporous and being soluble in that liquor; and that, if bodies be reduc'd into a multitude of Parts minute and sharpe enough, 'tis very possible that some of these, either in part, or in Conjunction with others, may acquire a size and shape that fits them sensibly to affect the organ of Taste, though perhaps the Bodies themselves, or perhaps those Bodies that afforded them, are more of some other nature than of a Saline. This may be illustrated by these gross Examples: that a ball of glass, for instance, though whiles 'tis entire it will not pricke and hurt the skin, yet if it be broken and beaten, the little fragments will, not as they are glass, but as they have points or edges. And so, though a stick being grasped in a Mans hand, will not pierce the skin or put him to paine, yet if it be cut into Tooth-picks or reduced to splinters, their sharpness and stiffness gives them a power to wound, that they had not before. Something Analogous to what we in these examples

see

See to be done upon the organs of Touch, may be conceived to be done upon the organs of Taste (which is a kind of Touch) of which an almost full instance may be given in purified *Salt-peter*. For though this concrete have but a faint and languid Taste, yet if it be carefully distill'd with some Additament that is not dissoluble in water, and is insipid, the parts of it being by the action of the fire, either broken asunder, or cleft or rub'd, or ground against one another till they are reduced to edged and pointed Corpuscles: *Salt-peter* I say, thus treated, will be resolved into differing substances, each of which has an extreamly strong and penetrant Taste, which whence it should proceed but from some such Mechanicall change as we have been describing, is not easy to declare; and perhaps also the Phlegmatick liquor, that is wont to come over in this *Analysis*, may at least, as to part of it, be produc'd by the Operation of the fire, and so the Phlegme being insipid, the Taste, I meane as much as was in the unanalyzed *Nitre*, may be

as well destroyed as those of the spirit and *Alkali* are generated by the operation of the fire: But perhaps there needs no other Argument that the same parts of matter, according to its differing states, may have the qualities that Chymists would have to be proper to this, or that Principle, than what we have took notice of in Chymicall Oyles, which do more strongly affect the Taste than the most of Salts themselves are found to do. And to confirme our Doctrine of the Producibleness of Salts by the Authority of *Helmont*, which is very great, at least with the Chymists of his own Sect, I shall observe that he assures us, that by *Paracelsus's Sal circulatum* from solid Bodies, among which he particularly, and in the first place instances stones, may be transmuted into actual Salt Equiponderant to the body whereof it was made. So that upon the Chymists supposition, that in these mixt Bodies there is both Sulphur and Mercury, besides a *Terra damnata*, the same portions of matter that preexisted in the forme of either of those simple Ingredients,

must

Vide *Helmontium* in
Tractatu
dicto Elementa. no.
11. &
alibi.

must by the operation of the fire, and an Anomalous *Menstruum* have been turned into Salt, and if the *Helmontian* Experiment be allowed of, whatever becomes of the Chymical supposition, we may safely conclude, that salt may be made of matter, that was not salt before, and consequently that salt may be *de Novo* produc'd. And thus much of the possible origination of Salts in generall, which I thought fit to premise to what I am going to offer about the Production of the Particular sorts of Salt. Though I have elsewhere enumerated and distinguished severall kinds, of these Bodies, whereto Chymists have given the Title of *Salts*; yet those that more properly deserve that name and more directly appertain to our present disquisition, seem to be chiefly these three: The *Acid*, such as Vinegar, spirit of Salt &c. the *Alkalizate* or *fix'd Lixiviat* salts, made by burning, such as salt of Tartar, and of Wormwood, Barillia, Pot-ashes &c. and the *Volatile* and *Urinous* Salts, such as salt of Hartshorne, of Urine, of Blood, of Soot &c. which taste and

10 *Of the Producibleness*

smell like that of Urine. Wherefore, if we can shew, that these may be produc'd *de Novo*, or, (which we have intimated to be equivalent for our purpose,) *transmuted* into one another, we shall I hope be thought to have succeeded in our present Attempt.

I. SEC.

I. SECTION.

Of the production of Acid Salts.

AND to begin with *Acid Salts*, we see that even *sweet Wines* will but too often without addition degenerate into soure vinegar, which will dissolve Corall and divers stones, calxin'd Lead, and severall other minerralls. The raine water that is imbibed by the roots of Trees is in those that bear Lemmons and Berberies changed into liquors, abounding with saline Corpuscles, that enable them to affect the Taste, and act on powdered pearles, and severall other Bodies as Acids are wont to do. Also *Guajacum* and divers other woods, that do not at all taste soure, will, being distilled in Retorts, afford spirits that are furnished with store of Acid particles, which, as I have tryed, will hiss upon *Alcali's*, and will dissolve Corall, and even lead it selfe calcin'd into *Minium*, and make *Saccharum Saturni* of it. Many other vegetable Bodies also

do, without addition, afford the like acetous liquors. And if it be objected, that these were preexistent in the Bodies whence they were obtain'd, and were only extricated by the operation of the fire, it will concerne those that affirme this to prove it, (which no body that I have met with hath yet done) and I shall the rather require it, because I find that the sweetest bodies and those of differing kinds, as (to omit, Reasons of the Sun) sugar and honey themselves, afford such a sort of spirits, which the tryalls I elsewhere mention, shew to be sharp and piercing enough. To which may be added, that in divers cases, where we are sure that *Acid* spirits were plentiful ingredients of a composition, as in *Saccharum Saturni*, & that magistery which the Chymists call *Salt of Corall*, (which are not the only mixtures I have made tryall of,) experience witnesseth, that the liquor, which comes over by distillation in Retorts, is not *Acid*, but quite of another kind; I would not, by what has been said, be concluded to deny, that *Acid* Salts may in some mixt bodies,

dies, be so associated with others, and obscured by them, as not to be discernable by the Taste, till they be separated by the operation of the fire. But to shew that such Acid Salts were *de facto* preexistent, as acid ones in the Body that affords them, their must be some positive prooffe, other than the liquors distill'd from them, since they, as we have already argued, may be not barely *extricated*, but may have their acidity produc'd by the operation of the fire; And wee see, that Salt-Peter, though it have no Acid Taste, may be made to afford by (a certaine way of) distillation, above three quarters of its weight of a highly Acid liquor; and yet it appears not, that such a great proportion of *Acid particles*, or possibly any considerable proportion at all, was employed by nature in the composition of *Salt-Peter*. At least having distill'd Earth, that I caused in my own presence to be dugg out of a Pigeon house below th Dunge; I had from it a Salt indeed, and some little Saline liquor, but of a nature, as for as I observ'd, very differing from

from that of the Acid Spirit of *Nitre*.
(But this Experiment I mention occasionally without building upon it.)

Nor do I think, it ought to seem incredible, that *Acid Salis*, as well as others, should be producible by the various splittings, attritions, coalitions and changes of Texture, which may be caused severall wayes, and especially by the Operations of the Fire, which most active Agent, making a vehement and various agitation of all the Minute parts that a body consists of, may consensantly to what hath above been intimated, split or breake some of them, and as it were grind others against one another, and in short, so alter their bulke, figure and motions, as to make them fit to stabbe or cut the tongue, and the other bodies that they worke on, after the manner of those Bodies we call Acid. But of this you may find more in our Notes about the Mechanicall Origine of Tastes, wherefore I now proceed to the second part of my Taske.

The

The II. SECTION.

Of the production of volatile Salts.

AS to the production of *volatile Salts*, we have an eminent Instance of it in the salt obtainable by distillation from *Soot*, for though the Woods we burn in our Chimneys seem not to have any thing of the taste or smell, of Urinous salt, nor have the dissolutions of the saline parts of such Woods communicated to water by their infusion in it, been observ'd (that I know of) to be of affinity in taste or odour with the salt of *Soot*; yet when Wood is first burnt in the fire, and then the *Soot* afforded by it is duely distill'd and rectified in fitly shaped vessels, there is obtained a spirit and a white volatile Salt, that in smell taste and divers operations by which we have examined them, appear to be of great affinity with those of Humane blood, or Urine, and may be easily enough mistaken for them.

But

But this double operation of the fire is not alwayes necessary to the production of volatile Salts out of Vegetables ; for, though by their distillation in Retorts we generally obtaine from them no dry salt at all, but a sowerish Spirit, with which I have dissolv'd Corall, Lead, and other hard Bodies, that Urinous spirits have not been observ'd to worke on, and they will, being put upon Urinous salts, make such an hissing and conflict, as are look't upon as great tokens of antipathy ; yet I remember that severall years agoe, I did from Mustard seed, that had been kept for a convenient time, obtaine by distillation a volatile Salt, that fastned it selfe in prettily figured graines to the upper part of the Receiver, and this at the very first distillation, so that there was no need of rectifying the distilled matter to separate that Salt. And to enforce this prooffe by something more considerable than it selfe, I shall add, that by an easy way by word of mouth communicated to me by a very ingenious person (Dr. D. E.) one may, out of very
many

many vegetables first duely prepared, without adding any thing to them, by bare distillations in Retorts, obtaine good store of volatile spirits and salts, which by their fugacity, colour, smell, taste, and divers experiments that I purposely made to examine them, were so like the salt and spirit of Urine, Soot, &c. that one, that knew nothing of the way they were made by, would readily have concluded they belonged to one or other of the newly named sorts of Bodies.

I remember that I have also sometimes produc'd a *Volatile Salt*, that one would readily have pronounced Urinous, of a *Minerall* it selfe; nor was that the onely *fossile* from which Experience perswaded me, that salt of this kind might be obtained.

Some other particulars relating to the production of *Volatile Salts*, I think fit to reserve, till I shall have occasion to mention them in another Section (as Instances of the production of Urinous spirits.) Only there is one thing, that I think not fit here to pretermitt, because I have not met with

with it in any Chymicall writer, the contrary being rather generally taken for granted; I shall add then, that it is not universally true, that saline substances, that are Volatile and ascend in the form of salt, are of an urinous nature, and enemies to Acids. For I have had from Verdegrease distilled *per se* with a strong fire, a very acid spirit which being warily rectify'd, afforded first a sowre phlegm, and then a penetrant spirit sharper than it, leaving behind it in the vessel some few spoonfulls of a dark coloured liquor, which being sett aside, and suffered to rest, did in a great part, shoot into transparent Chrystalls large but thin, almost like those of Silver dissolv'd in *Aqua fortis*: They appeared prettily figured at the edges but were so oclly connected among themselves, that I was not able to refer them to any of the known Geometrical figures; and their brittleness made them the less tractable, but their smell which was strangely piercing and not inoffensive argued them to be of the same nature with the Acid spirit which had come over with them.

But

But there is a more constant and easy way of producing such a Volatile salt, as my observation mention's. For if *Amber* be gradually and warily distill'd it will afford besides the phlegm, spirit and oyle, a dry substance which though the Chymists call the *Volatile salt* of *Amber*, I found to be really of an Acid nature, by several of those tryalls, by which we are wont to discern, that a body belongs to the family of *Acids*.

7

The

The III. SECTION.

Of the production of *Alkali's*
or *Lixivate Salts*.

THe third and last sort of Salts, which we are to endeavour to shew to be producible, are the *Alcalies* or *Fixt Salts*, which seeme to have an Antipathy with *Acid* ones, by making a conflict with them, and exercising diverse operations contrary to their's, (as I have in another Discourse more fully declared.)

As for the Origine of these *Fixt Salts* of Burnt Bodies, the Spagirists are not of the same mind about it. For, the almost universall opinion of the Chymists that preceded *Helmont*, and the more common opinion even of later Chymists seems to have been, that these fixt *Alcalies* are preëxistent in mixt Bodies, and that the fire does but separate or extricate them from the other parts of the compounded Body. But *Helmont* followed in that

Vide Hel-
montium
in Blas
humano
no. 38. &
43.

that by severall Chymists that dissent from him in other points) has ingeniously conjectur'd, that these Lixivial salts do not preexist in their Alcalizate forme in the Bodies that afford them, but are Productions of the Fire, by whose Violent action a part of the Salt, which in the Concrete is naturally all volatile, lay's hold of some parts of the sulphur of the same Body, and both together are colligated and fixt into an *Alkali*, which Fixation he somewhere exemplifies by that which happens, when *Salt-Peter* and *Arsenick*, that are both volatile, being exposed to the fire, are by it's operation fluxt and made to fix one another. But though this account be ingenious, yet I doubt, whether it be so cleare and satisfactory, especially since 'tis applied to all fixt *Alcalies*, as the Embracers of it thinke it. For, besides that it may be question'd whether it have yet been well proved (what *Helmont* teaches) that all the Salt of mixt Bodies before their combustion is volatile, it is not declared, what volatile salt is meant,

C

though

*Vide Blasp
humanum.
No 41.*

though it be plaine, that some Bodies that afford a fixt Salt, do abound in Acid spirits, as Oake, Box, and many other Vegetables; and others, as Hartshorne, Ellood, Urine &c. abound with urinous, that exercise hostility with Acids: And I have found that from some Bodies I could obtaine both *Acid* spirits, and such as are wont to be called *Urinous*. 'Tis not easy to explaine how the Volatile Salt comes to unite it selfe so intimately with the oyle (or sulphur) and though it be also volatile it selfe to compose with it a Body capable of enduring the violence of the Fire, since we have more than once tryed, that the Volatile Salt of Urine, or of Hartshorne, and a Chymicall oyle, as of Turpentine or any such, being put together, the Salt will indeed associate to it selfe some particles of the Oyle, but will nevertheless in their company sublime in the forme of a Salt, with a very gentle fire. And the Example, that *Helmont* somewhere gives of Arsenick and Nitre, do's not satisfy me, because that

when

Vide Hel-
montium
Complex:
atque Mist.
&c.

when I made equal parts of those two Bodies to be mingled, and in a stronge Crucible fulminated together, a great part of the mixture was driven away by the fire, so little alter'd; that 'tis very dangerous to be too bold with the fumes, and a good part of what remained was fixt only in comparison of the crude Arsenick, but not comparably to Salt of Tartar, or some such other true *Alkali*; and the constancy of the part, that was more fixt, may probably be ascribed to the Salt-peter, which we know will without the help of Arsenick afford a great deal of fixt salt, if about halfe of it be burnt away, by the help of powdered Charcoal, or some other convenient additament. It may also serve to weaken this instance of *Helmont's*, that there are other instances, in which we may observe, that no such thing happens as his *Hypothesis* may make one expect. For common Sulphur is by Chymists said to abound in an Oily part, upon whose account it is very inflammable, insomuch that they would have other inflammable Bodies to be

so, by their participating of Sulphur. That this concrete also abounds in Salt, is evident, according to their principles, by the acid *Mensstruum* afforded by it, that goes under the abusive name of *Oleum Sulphuris per Campanam*. And yet these Ingredients, combin'd by nature, make up a Concrete which is so volatile, that both in close vessells and the open fire, 'tis almost totally volatile. And in that mixture of highly dephlegm'd spirits of Wine and Urine, that *Helmont* calls the *offa alba*, though the Urinous salts do manifestly combine themselves with the spirit of Wine, which being totally inflammable, the Chymists referr to their oyle, or sulphur, yet the coagulated mixture do's not by this association of Ingredients grow fixt, but proves very volatile. I will not here urge, in favour of the common opinion of the Chymists of the Preexistence of *Alcalies* in mixt Bodies, that a Corpuscularion may say two not inconsiderable things; whereof the *first* is, That there is no need of supposing a Colliquation of salts with Sulphurs, Oyles, or any thing

thing else to produce fixt salts ; since , besides that that supposition do's not explaine , how two volatile bodies come to compose one that is fixt, 'tis plaine, that a body yet more fixt may be made without any association of differing Principles. For the Earth, that together with the *Alkali* remaines in the ashes of a burnt Body, is more fixt than the *Alkali* it selfe, and yet derives not its Fixity from any combination of Elements , or Principles , but from the grosseness, solidity, or weight, and unsitnes for avolation of the Corpuscles it consists of. And the Corpuscularian may add in the *second* place, that whereas some instances are alledg'd wherein there is supposed a lessening of the quantity of the fixt *Alkali* of the Concrete, by operations that are said to carry off the volatile salt, before the Body comes to be incinerated ; It may be answered, that perhaps those very operations did but rarefy and volatilize part of the preexistent *Alkali* , and so left the less of it to be recover'd by burning; as the Chymists tell us, that Fermentation rarefy's the

oily parts of the Juice of Grapes, and subtilizes them into vinous spirits, and so do's much lessen the quantity of the oyle. And when *Wood* is burnt in a Chimney, 'tis not in the forme of an acid salt, which is the only that is commonly observ'd to be driven away by Distillation in close vessels, but in that of an Urinous salt, (which is a kin to *Alcaly's*, and an Enemy to *Acids*) that the saline part of the wood is made to ascend; as may appear by the Distillation of Soot. Such Arguments as these, a Corpuscular Philosopher might, as I was saying, urge in favour of the more received Spagiricall opinions. But instead of insisting on them, I shall only invite you to take notice of what I observe in *Salt-peter*. For, though by distillation or any other way that we yet know, there is no oyle to be separated from it; yet above halfe the body of it may be easily and quickly turn'd into a fixt salt, in Colour, Taste, and Operation, much like that of Tartar, and other incinerated Vegetables. And such an *Alkali* I have made without the help of injected Coales or any other

other Body furnished with a combustible Sulphur; so that it seems not, at least universally true, that to the Production of an *Alkali*, there is necessary to be at hand an oyle, or Sulphur to be laid hold on by the volatile salt, and fixt together with it. But this Experiment is far more congruous to our Doctrine, which derives all those salts from the size, shape, and solidity or weight of the saline Corpuscles, since the same *Salt-peter*, whose greater portion may, by the operations newly mention'd, be reduc'd to a fixt *Alkali*, may, by being distill'd with a convenient *Bolus*, have its greater portion brought over in the forme of an Acid spirit or salt, which it selfe may afterwards be made materially to concur to the Production of an *Alkali*. I might add, that even from one of *Helmonts* own Experiments, my conclusion may be inferr'd, since he somewhere, and, if I mistake not, in more places than one, affirms, that by the addition of more *Alcalizate* salt and the operation of the fire, the Earth it selfe that is in the Ashes may be turned into Salt,

Cinis proprio suo Alkali fit Sal mercurii complex. aque mist. no. 12. Idem Helmontius in Blas. humano no. 39. videtur.

which if true, argues, that a fixt salt may be made of that which was not before either of saline, or of an oleous nature; and consequently without any such Combination of Salt and Oyle or sulphur, as his *Hypothesis* supposes. From which Experiment I may also inferr the possible Origination of *Alcali's*, by the Mechanicall changes, that without the addition of oyle or sulphur the Operations of the fire may produce in the part of a mixt body; since Earth (excepting water) seems the most indispos'd of any part of the Concrete to be turned into fixt Salt.

I must not here pretermitt an observation that I have made, which seems to overthrow the opinion of those learned Chymists, who will have the violence of the fire to be alwayes a necessary Agent, as I allow it to be ordinarily, to the production of a fixt or lixivial *Alcali*. I said *seems to overthrow*, because I had not the opportunity to repeat my tryalls, and am not sure, that the Salt I employed was altogether genuine, in regard I cannot

not here in *London* meet with it, at any Rate; but I have great cause to thinke it was right, both for other reasons and because it was sent with other things, for a present out of the East, to an inquisitive Noble Man, who had been lately Ambassador for his *Brittish* Majestie at the *Ottoman* Court, and who was pleased as a rarity to present it me.

This *Salt* was affirmed to be the true *Egyptian* Nitre, mentioned so much by Ancient Writers: and indeed I found it to agree much better with the Notion, that books had given me of it, than with that sort, to which Chymists generally give the name of Nitre, and which is indeed the only Nitre, to be usually met with in our *European* shops: where it is best known by the vulgarly received name of *Salt-Petre*. But to say something of our *Egyptian* Nitre, though it be not pertinent to mention here all that I observ'd about it, yet I must not here omit two things, that I made tryall of, with that little, which escaped the misfortune that lost me all the rest, that

that seem considerable in the present occasion.

The first whereof is , that this *Nilotick* Salt was very apt to imbibe the moist aire, as calcined Tartar, and other fixt *Alkali's* are wont to be , to which resolution we do not find our Salt-peter, if it be unmixt , dispos'd. But the other & more important thing I observed, was this, that having upon this *Egyptian* Niter, Crude as it was, poured spirit of Salt , this Acid liquor did presently, even in the cold , worke briskely upon it , as if it were a fixt *Alkali* , or at least abounded with such a lixivial Salt. And here upon the By, give me leave to take notice of a text of the holy Scripture, that has sometimes puzzled not only me, but far better Criticks in the *Hebrew* tongue than I. And it is a Passage to be found in the 25. *Chap.* of *Solomons Proverbs* , where to illustrate Things very incongruous to one another , the disagreement of Vinegar and Nitre is mentioned, for supposing the words to be rightly translated, as besides the Authority of

es I know not how many versions, the very sound of the *Hebrew* word *Nater* or *Natbar* argues it to be, it seems very hard to find what show of Antipathy there is between Vinegar, and the *Salt-peter* that is commonly sold in our shops for Niter; wherefore strongly presuming that *Solomon*, who reigned in *Judea*, a country near to *Egypt*, and had much commerce with the *Egyptians*, whose Kings daughter he had married, made use of *Egyptian* Nitre as the best known, if not the only in his time and Country, and might have found in this Nitre, some quality very differing from any we find in our Salt-peter; as I remember that in the Prophet *Jeremy* Niter is mentioned, as a very absterfive thing, and fit to cleanse Womens skins, which is a knowne vertue of our fixt *Alcaly's*, but not observed in pure Salt-peter; wherefore when once I receiv'd the Niter that I have mentioned, and saw in it signes of an Alcalizate nature, I quickly poured upon it some strong Vinegar, and found as I expected that there presently ensued a manifest conflict, with noise, and store of bubbles, with

Jer. 2. 22.

with which Experiment I afterwards acquainted some Criticks, and other learned men who were not ill pleased with it. But this Theologicall use of the Alcalizate nature of Niter, not being that which I chiefly mentioned it for, I shall now make the Philosophicall use I intended, by taking notice that *Egyptian* Niter being acknowledged to be a Native Salt, and made only by the Evaporation of the superfluous water of the *Nile* (or some other such liquor) is yet of a lixiviate nature, or at least abounds with particles that are so: Though as I freshly intimated, it was produced without any precedent Incineration, and the matter of it suffer'd not, or at least needed not suffer any violence of the fire, to make it afford an *Alkali*.

I have represented these things, not for that I pretend to be sure that *Alcalys* may not be produc'd in multitudes of mixt Bodies, especially in a good number of Vegetables, after the way proposed by *Helmont*, or by some such like: But partly, because it seems not alwaies necessary to the existence
of

of an *Alkali* in Nature, and to be the only way it can be produced by; and partly because I would give you and your Chymical friends occasion to cleare (as far as they can) and confirm the doctrine I have questioned. 'Tis true that being a far greater friend to Truth, than an Enemy to the Chymicall *Hypothesis*, I would not stifle what may serve to advance that, in favour of *Helmonts* doctrine, though this would never so well accommodate my present argument. But I have no great temptation to surmount in this case, for it concerns very little the maine scope of this discourse, whether *Helmonts* way or any other, of the production of *Alcaly's* be embraced, since it will suffice for my purpose, if some Bodies belonging to this family, or kind of Salts may be produc'd; I say some, because (as I have already intimated) I will not peremptorily assert, that all fixt *Alcaly's* are productions of the fire, or made by the help of it; though I do not readily remember, that I have met with any (except *Egyptian Niter*) that are not. But I shall wave that question,

question, because my intended brevity calls upon me to proceed to the mention of some particular instances, fit to perswade us, of the producibleness of some *Alcalizate* Salts.

'Tis known that Chymists generally looke upon *Spirit of Nitre* and *Aqua-fortis*, as Liquors containing not *Alkali's* but *Acid* Salts, which they conclude not only from the Taste but from the great ebullition that is made, when those liquors are poured on the Salt of Tartar, fixt Nitre, Pot-ashes, or other such unquestion'd *Alkali's*. That Sea-salt likewise do's not containe *Alkali's*, is generally taken notice of; the spirit of it being justly reckon'd among the *Acid* ones, and when I purposely examined that Concrete by Distillation, the remaining Salt, though the fire had been violent, was very differing from *Alcalies*. And yet my conjectures inclining me to suspect what the event would prove, I severall times made the following Experiment upon Sea-salt, that yet retain'd all its acid spirit in it.

Upon

Upon well dried and powdered Sea-salt we put into a Retort sometimes an equall, and sometimes (which I preferr) a double weight of good spirit of Nitre, or *Aqua fortis*, and leasurely distilling all that would come over, we took out the dry salt remaining at the bottom, which we found much chang'd, both as to colour, (a good part of it being usually very reddish) and as to taste, which was differing enough from what it had been before, and might probably have been made much more so, if fresh spirit of Nitre had been once or twice more abstracted from it. This Salt being againe powder'd (for 'twas in a lump when taken out) and put into a Crucible, plac'd in a convenient fire, was by the repeated injection of fragments and well kindled Charcoal made to flash divers times almost like melted Nitre; and when it would flash no longer, the remaining matter being taken out did in great part appeare to be brought to an Alcalizate Nature, for it had a fiery taste upon the tongue: if Spirit of Nitre or *Aqua fortis* were poured on it,

it, it would make an Ebullition; it would turne Syrup of Violets green, and in short, exhibit diverse *Phænomena* of Alcalizate Salts.

Another way there is like that mention'd of making an *Alkali* out of Nitre, which is thus done; Poure upon it an equall weight, or halfe the weight of stronge oyle of Vitriol, and having diluted the mixture with a convenient proportion of faire water, distill it by degrees, till there remaine a substance very dry; powder This, and mix it well with about an eighth part of beaten Charcoal, keep them in fusion in a stronge and cover'd Crucible, till the mass grow very blacke, and a little of it, being taken out with a wire, taste fiery upon the tongue, (which may happen in about halfe an houre or an houre according to the quantity of matter, and degree of Fire) Then take out the blackest or deeply red mixture, which will very easily imbibe the moisture of the Aire, and you may finde it, at least whiles 'tis hot and dry, of a more fiery Lixivial Taste than Salt of Tartar it selfe.

selfe. It will make an Ebullition with Acid spirits, and precipitate diverse solutions made with them, it will turne Syrup of violets green, and in short discover it selfe many wayes to be of an Alcalizate nature, though it be associated with a Sulphur, that may by diverse methods be made appeare to be contained plentifully in it.

It is also considerable on this occasion, how the same Body, without the addition of any other Salt, may, by the various manner of the fires application to it, be made to afford, either little else than Acid Salt's, or a lesser or greater quantity of *Alcali*. For, if fine Salt-peter be dexterously distill'd with about thrice it's weight of some fit Earth, (but not, as is usuall, with powder'd Bricks,) it will sometimes afford very near as much Spirit of Nitre as the Salt weigh'd, and though this like other liquors, be not without phlegmatick parts, yet besides that it may be doubted, whether most or many of them were not produc'd by the transmuting operation of the fire,

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38 *Of the Producibleness*

we may suppose, that five parts of six, or six of seven have been distilled into dephlegm'd spirit.

But if according to the way I have
**In the Essay of the differing parts and Redintegration of Nitre.*
 elsewhere circumstantially delivered, (which is by frequent injecting into flux'd Salt-peter, small peices of kindled Charcoal, till one can make it flash no more at all,) you make fix'd Nitre, you may obtaine from Nitre thus handled halfe it's weight and perhaps better, of an *Alcalizate* Salt, that many would by it's taste and operations guess to be Salt of Tartar.

But to shew yet further how much the Production of this *Alkali* depends upon the operation of the fire, which as 'tis variously applyed, may vary the Texture of the Salt-peter, my Conjectures led me to try the following Experiment, which I did with success from the beginning; We tooke a pound of good Salt-peter, which was but grossly beaten (for it should not be finely powder'd) and having laid it on a Conical heap upon a flatt tile, that the fire might on all sides have access

access to it, wee Caused the upper part of it to be kindled by a little fragment of burning coal (which may be afterward thrown away :) then we caused the Laborant with an iron rod dexterously to stirr the kindled part of the Nitre, that the Ignition might be presently communicated to as many parts of the Salt, as was possible ; and this nimble stirring of the Mass, that the fire might be more diffused, and more parts might be obverted to the Aire, we caused him to continue to the end of the operation: by which method within few minutes, we obtained, more than once, out of 16. ounces of Salt-peter, about 10. ounces or better of fixed Nitre, very lixivial in taste and operation ; and for the colour it was of a pleasant greenish blew, and deeper than Salt of Tartar will usually be brought to, by being (in a Crucible,) kept twenty times as long, in a good fire.

The other scopes and uses desin'd in this new and quicke way of making the *Alkali of Nitre* belong to another discourse, the Experiment,

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which will scarce succeed without a diligent management, being here mentioned to shew, what quantity of Alcalized Salt may by a differing operation of the fire, be obtain'd from Nitre; which (crude Nitre) in distillation skillfully made for the purpose, may be in great part driven over, in the forme of Acid spirit, and Phlegme, and leaves so little true *Alcali* behind it, that I have wondered at it, being sometimes scarce able to find any at all, though I purposely tryed to separate it from the Tobacco-pipe clay, which the Peter had been mix'd with after a distillation, wherein not half of the Salt had been driven into the Receiver, in the forme of spirit.

And to shew, that to make the fixed Salt of Nitre, the Actual inflammation of it, in the open aire, is not necessary, as very learned Men have supposed, and that 'tis possible, whatever is presum'd to the contrary, to make an *Alcali* of Nitre, though charcoal, or some other combustible Body be not added to it,

it, to kindle the Corpuscles of the Nitre by its sulphur; and by the association of some part of the same Sulphur with the saline parts of the Nitre, to compose an *Alkali*; to shew this, I say, I more than once made the following experiment: With a convenient quantity of good Salt-peter we carefully mingled about an eighth part of tobacco-pipe clay, and putting the mixture into a Crucible closely luted at the top, we kept it by a fitly graduated fire, in fusion for some houres. and found as we expected, that the remaining Salt, (for part would get through the lute, or Commissures in the forme of fumes) was turned into an *Alkali*, of a faire blew colour, like the better sort of that fixed Nitre, which is made with Charcoal. This Experiment and that formerly made with Tobacco-pipe clay, seem plain'y to argue, that to the making of fix'd Nitre, which is confess'd to be an *Alkali*, a congruous change of Texture may suffice, whether that change be attempted to bee made in open vessels, or in close ones, with, or

without the addition of the sulphur of Charcoal, or any other such combustible Body. Upon the same ground, that I had for trying the former Experiment, I attempted, and not without success, to make an *Alkali* of Salt-peter, by Colliquating moderate quantities of it, severall wayes, (and keeping it in fusion) with some Metalls: I say, *moderate quantities of Nitre*, because an Ingenious Gentleman, to home I communicated this Practise, could not make it succeed in any considerable quantities. And to obviate the suspicion, though perhaps groundless, that some Chymists might have of the material concurrence of a good portion of the combustible sulphur, presumed to be in the Ignobler metalls to the Production of the Nitrous *Alkali*; I shall add, that our Experiment succeeded, when we tryed it more than once, with more than ordinarily fine silver, whose Sulphur, if it have any, is granted to be fixt or incumbustible. And I remember the last Tryalls afforded us a blewish *Alkali*, though there were employ-

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ed but a fifth part of silver, in reference to the Nitre; and though the fire (which was continued for some houres) was so moderate, that the Metall, though thinly laminated, was not melted. And of an ounce, that was put in, there wanted but foure graines, which small loss might easily be imputed to diverse accidents.

After what is said of the Production of *Lixivate Salts* and *Alkali's*, it will not be impertinent to add, that as they may, by the operation of the Fire, bee produc'd, so by the operation of the fire, they may be destroyed or dispoil'd of their Alkali-ze forme, and turn'd into a substance of a Nobler nature. This I am induc'd to thinke very probable, by some Experiments, among'st which that which seem'd the most considerable was this: We tooke a pretty quantity of good salt of Tartar, that had been purifyed by solution and coagulation, and having put it into a Cleane Crucible, we kept it in a strong Fire (that made the Crucible red hot) for a good while; then giving

it at length a stronger fire, we poured it or (afterwards) tooke it out of the pot, and dissolved againe as much of it as we could in cold water, which being set to run through Cap-paper, there appeared, as I foresaw, in the filter a pretty deal of Matter, that would not (as the whole Salt had done at first) be dissolved in the water, but was turned into a kind of earthy Substance. Then coagulating againe the solution that had passed through the filter, into dry Salt; we exposed it againe in the Crucible to a strong fire, and putting it againe into water, we perceived it would not totally dissolve, but left in the filter a slime or mudd. And 'in this manner' we proceeded to ignite, dissolve, filter, and coagulate the same salt of Tartar many times, for, if I much mistake not, it was 16 times, and still found such an earthy substance as has been spoken of remaining in the filter; and the rest of the Salt of Tartar so little alter'd, that being somewhat tyred, and other wayes diverted, I desisted from prosecuting the operation to the

the uttermost, concluding it highly probable, that the remaining Salt, might by the same way of management be brought to yeild more and more, of that same substance, which either was earth, or of kin to it, being at least somewhat that was of a nature very differing from Salt of Tartar, since it was not like it, fiery on the tongue, and was indissoluble in water, as Earth, but not Salt of Tartar, is knowne to be.

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The IV. SECTION.

IT may bring some illustration and add some probability to what has been discours'd about the *producibleness of salts*; if we consider what happens in the Compositions and Decompositions of saline particles and their operations on other bodies and on one another. For if it appear that by these manifest and Mechanical ways, such Alterations may be made and such qualities produc'd, as are either altogether or very near as considerable, as those which discriminate the several families of *Salts* formerly spoken of from one another, and form this or that Chymical principle; it will, I presume, be judged the more credible, that these families of *Salts* may be either transmuted into one another, or otherwise produc'd, and so may not be Primordial and Immutable beings in the sense wherein the Chymists would have them to be such. I have elsewhere taken notice of the Production of Vitriols,

Vitriols, sal Armoniac, Borax, and
diverse other factitious salts, for
which reason, I shal not insist on
them here, the rather because it may
suffice for my present purpose, to
take notice of two Salts, whereof
the one is meerly factitious, and the
other such in great part, and yet
each of these by a very slight and
easie way of ordering it, afforded
me differing saline Concretions, some
of which resembled a Salt which
many judg the most simple and natu-
ral that we yet know of.

*In the Es-
say of the
usefulness
of Chymi-
stry to the
Empire of
Man.*

To show then, that common salt
it self that seems the most primitive
and simple amongst gross and visible
salts may be produc'd by a change of
Texture made in body's very differ-
ring from common Salt, I shall recite
an experiment which though it have
sometimes failed me, yet it has di-
vers times answered my desire, though
I shall now relate but that single one
of my last tryals that succeeded
best.

That which our *English* Glassmen
call *sandever*, and the *French*, of whom
probably the name was borrowed,
suindever

Juindever, and is you know that recreation that is made when the materials of Glass, namely *sand* and a *fixt lixiviate Alkali*, having been first baked together, and then kept long in fusion, the mixture casts up the superfluous salt, which the work-men afterwards take off with Ladles, and lay by as little worth: This Salt seldom used by Mineralists and scarce wont to be mentioned by the writers of Courses of Chymistry, I have thought fit to employ about several purposes, invited thereto by considering the usual way wherein it is produced. For in *sandever* we have a Salt which was once altogether Lixivate, but which having been kept long melted in a strong fire with sand (or flints or pebbles) must have had its saline corpuscles variously and forcibly ground or rubb'd against another, and against the particles of the sand, some of which it may also have dissolved and retained with it, by which rude justlings and mutual Attritions, I thought it very Probable, that the *Alkali* must not only have been considerably altered, but variously

ously too, some parts being changed more and after a differing manner than others, by which means *sander* may consist of portions differing in quality'd both in reference to the lixiviate salt that was at first employ'd and to one Another.

We took a pretty quantity of good *sander*, and having dissolved it in fair water, and filtered it, we set it to evaporate in a digestive furnace, till a saline crust, as if it were a thin plate of Ice, spread it self upon the top of the liquor, then suffering it to cool and chrySTALLize, we broke the mentioned cover to come at the ChrySTALLS, and set the liquor we had poured off from them to evaporate further and shoot again: and in this Method we proceeded whilest we judged worth while to do so; by this means we obtained good store of ChrySTALLS, whose figures were not the same, but many of them differing enough, though most of them transparent and prettily shap'd, as if nature had at once affected variety in their figuration & yet confin'd her self to Geometrize; but the chief thing for which I mention this experiment,

periment, is, by this way of proceeding, I more than once obtain'd (not on the Very surface of the water, as is usual in the concretion of sea-salt) but in other parts, and Chiefly beneath the surface of the Saline plate formerly mentioned; a considerable number of grains of Salt, that better answered to the description of Common salt, than dissolved and filter'd sea-salt it self is wont to do; for these grains that were of no despicable bigness were as like little Cubs or die's, as if they had been made by a skilful Jeweller, and their Surfaces had a smoothness & glossiness much surpassing whatever I had observed in Marine or Common Salt.

I may confirm the difference I have mentioned to be between *sandever* and Common *Alkali's*, if I here add that some while ago having set a good quantity of filtered solution of *sandever* to coagulate in a cool place, & thereby brought a great part of the salt to coagulate into Chrystalls, almost like those of Nitre, but so very Diaphanous that divers of them were clear as rock chrystall it selfe; I did not observe them to relent by the moisture of
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the Aire in along time, though the Glafs they were kept in were negligently enough covered with paper only, which argues their Texture to have been remote enough from that which is proper to *Alkali's*. And to shew that they were also Salts of a peculiar nature, I shall further observe, that if they were expos'd though but to a gentle heat, they would in no long time loose their Transparency, and be reduc'd to a white and fine *Calx*, which being weighed and redissolved in water, and made again to ChrySTALLIZE, would be Diaphanous, and concoagulate with it self so much of the water, as suffic'd to give a very notable increase of the weight

Sandever, which afforded me the first of the two Instances I promised you of the Production of salts, is one of those body's that many would reckon amongst those that are almost meerly Artificial. I shall now mention a second instance of a body wherein Art seems to have little to do save the easy extrication of its particles, from those wherewith nature had

had blended it in a Humane body: If then *Mans urine* after having been kept some weeks in a clos'd vessel be exposed to a moderate fire, first it will yield a spirit and a Volatile Salt, and then a very copious phlegm, which being torally exhal'd there will remain a dry *Caput mortuum*, and this being warily calcined, dissolved in water, and coagulated, if the Experiment succeed with you as it did with me, you will find the Salt very different from a common Lixiviate *Alkali*, rather you will find saline Concretions of differing formes, if not kinds; for I observed some to be oblong and to look like small Chrystalls of Nitre, others to be of figures resembling those, that Geometricians call *Rhombus's* or *Rhomboides*; and one of the fairest of these Lozenges, I remember for tryall sake, I kept for many dayes expos'd to the aire, and that in winter, without finding it run *per deliquium*, as a peice of Common *Alkali* of that bigness would have done, in a litle part of that time. But besides those numerous saline concretions that

I could not easily reduce to any known figure, there was which I chiefly expected and would have you take notice of) a considerable number of fine grains that lookt like common Salt, and were indeed more exactly cubicall in their figure, than the grains of sea-salt themselves are wont to be; And I have the less cause to doubt that the sea-salt abounding in our *Caput mortuum* was not a common lixivate *Alkali*, but consisted of parts of other natures, especially of such as compos'd sea-salt, because I observ'd, that the *Caput mortuum* when expos'd to calcination began early to melt in the fire, before it was near calcin'd, as not an *Alkali* but sea-salt would have done; also because the taste was much nearer to that of brine than to that of *Lixivium*; and because lastly it would make no conflict with the spirit of salt, as an *Alkali* would have done, but did make of a solution of silver in *Aqua fortis* a white precipitate like that we make of that metal with sea-salt, but not with *Alkali's*.

And because a mischance unreasonable

E blyde.

deprived me of the *caput mortuum* of domestick Urine prepared in my own Laboratory, I was fain to procure a supply of fixt salt of Urine made by a diligent Spagirist of my acquaintance, who had wrought much upon that liquor; and having dissolved and filter'd a pretty quantity of this salt, and suffered the solution to evaporate slowly, till it began to have a skin, I found the Chrystalls it afforded in a cool place to be some of them an Inch or two long, and shap'd almost like Chrystalls of Nitre, save that they were sharper at both ends, and to many of them were fasten'd store of minute and oblong Chrystalls prettily shap'd, which were plac'd almost perpendicularly upon the greater portions of salt, which by this means obtained a shape, not much unlike that which the French Engineer's call *cheval de frise*: these Chrystalls as they did not resemble common *Alkali's* in there figures, so they were unlike to them in divers other respects. For though some oyle of Tartar *per deliquium* being pour'd upon some of them, there ensued no manifest

manifest combustion, as is wont to be produc'd when that liquor is mixt with a salt, where an Acid is predominant, yet being beaten and mixt with an Acid spirit as that of Common salt, they made not the least ebullition or conflict, though they were stirred up and down to excite it, nor did *aqua fortis*, good enough to be worthy of that name, produce any hissing noise or froth when it was put upon the salt of Urine, though at length it dissolved a good proportion of it. And though strong oyle of Vitriol being put upon some of the forementioned Chrystalls, did readily work upon them and in corroding them excite a good number of bubbles, yet that did not surprise me, nor make me conclude the salt to be Alcalizate, because I have observed oyle of Vitriol (the not spirit of salt or *Aqua fortis*) to work after the like manner upon common salt, of which that the fixt salt of Urine did participate I judge very probable, partly upon the account of the *Phænomenon* newly recited, partly because I found that by impregnating

Good *Aqua fortis* with a competent quantity of the fixt salt instead of dissolving in it sea-salt, I could make it capable of corroding foliated Gold, even in the Cold; and partly also, because that some part of the solution of our fixt salt, that was more slowly coagulable, being mixt with oyle of Tartar, presently grew thick and muddy, and soon after let fall a precipitate copious enough: And another part of the same solution did readily precipitate Silver dissolved in *aqua fortis*, but would not so much as discolour a stronge solution of sublimate, (made in fair water) from which a common Lixivate *Alkali* would have immediately struck down an Orange coloured powder.

A light suspicion I once had that the common salt, that most men eat to season their Aliments, may in some degree impregnate *Mens Urine*, gave me the Curiosity to examine that of *Horses*, which I found to require rather a shorter than a longer putrefaction than Humane Urine to make it fit for distillation; but the *Caput Mortuum* of this also, I was by an accident

accident hindered to examine sufficiently, but by the spirit and Volatile salt the liquor after putrefaction easily afforded, it seem'd probable enough, that the fixt salt would have been not unlike that of *Mens Urine*; of which last nam'd olid and desiccable liquor I chose to make an Instance in this place, because Chymists are not wont to care for extracting the fixt salt of it, (which is therefore commonly presumed to be like other *Alkali's*) but as soon as they have distill'd the saline spirits, throw away all the rest as nothing worth: which practice, as generall as it is, I cannot commend, for though I am not altogether of *Helmonts* mind, where he saies, that *Wisdom despises those that despise the indagation of Urine, and refuse by the fire to search out its Contents*; yet I think that those who understand the mystical writings of some of the best Chymicall Philosophers of former times, will look upon it as a more tolerable *Hyperbole*, than other Men or even Vulgar Chymists imagine it to be.

The Second Part.

Of the Producibleness
of Spirits.

The I. SECTION.

Of the Production of Vinous Spirits.

AS for what the Chymists call *Spirit*, they apply the Name to so many differing things, that this various and ambiguous Use of the *Word* seemes to me no meane proof, that they have no cleare and settled Notion of the *Thing*. Most of them are indeed wont in the generall, to give the name of *Spirit* to any distill'd Volatile liquor that is not inspid, as is *Phlegme*, or inflammable, as *Oyle*. But under this generall Terme they comprehend liquors, that are not only of a differing, but must be, according to their Principles, of a quite contrary nature; some of them being *Acid*, as Spirit of Nitre, of Salt, and of Vinegar

it selfe; and some of them *Urinous*, or, as some would have it, *Volatile Alkali's*, which are such Enemies to the former, that, as soon as they are put together in due proportions, they tumultuate and grow hot, and usually continue to fight till they have disarmed or mortified each other. Besides these two Hostile Families of Spirits, there is a third sort, which they call *Vinous* or *inflammable*, which though very subtil and penetrant, is not manifestly either Acid, or Alcalizate; I say, *manifestly*, because the Taste and Smell of this sort of Spirit is differing from both the sorts last named; and yet is referr'd to one, or the other of them, by some Learned Spagirists; with whom I neither need, nor desire to dispute about this matter; since it may suffice for my purpose, if it can be made out, that all the three sorts of Spirits above mentioned, the *Vinous* or *inflammable*, the *Urinous* or *Alcalizate*, and the *Acid* may be produced, and consequently may be other than Primevall bodies.

And to begin with the first named, these *Vinous* Spirits are so producible

by Art, that we seldome find them produced by nature alone, which does indeed make the Juice of Grapes, but does not make wine, nor the Spirit of wine, unless, by the help of Man, that juice be press'd out, and fermented. And the case is yet more plaine in the ardent Spirits made of Ale, Beere, and in the like vinous spirits made by the decocting and fermenting the seeds and other parts of Vegetables. And 'tis observable to our purpose, that *Must* (or the Juice of grapes newly press'd out) does not in distillation yeild a Vinous and inflammable Spirit. And I remember, I had once the pleasure to laugh at a Man, otherwise very ingenious, who, to catch the subtile Vinous Spirit that he would have me thinke was lost in the common way of handling wort, made it worke in a huge Copper Limbeck, to catch the Spirituous parts that he thought would otherwise fly away; by which meanes, instead of the ardent spirit he expected, he got nothing in his Receiver but a nauseous Phlegm. I have also found by Tryall, that Raisins

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(which we know are but dried grapes) being distill'd alone afforded an *Acid* and Empyreumaticall, but not a vinous Spirit, whereas, when I carefully fermented them with a due proportion of water, they would afford me in distillation an ardent spirit like that of wine.

If it be objected, as I presume it will, that the Vinous and inflammable Spirit, that is by fermentation obtained from body's, was actually in them before, and is only extricated by Fermentation, I answer, that this is *Gratis dictum*, and is therefore not to be admitted till it be proved; since *Raisons*, and such other Fermentable body's do not, upon the supposed *Analysis* made by Distillation, afford a Vinous Spirit, but one that is very differing from it. And I see not, why the change of Texture may not turn some part of the Juice of Grapes, into a Vinous and inflammable liquor, since a little further change is able to turne the same Juice into a liquor that is *Acid*, and neither Vinous nor inflammable, as 'twas before. And I have found
by

by tryall, that even this Vinegar ; crude as it is, being Saturated with *Calx of Lead* made *per se*, would afford a Spirit not acid, but of a very differing Taste, and inflammable, like the spirituous parts of wine. And if it should be further objected, that these inflammable Spirits were not produced by these operations, but, preexisting in the newly express'd juice of Grapes, were only extricated by Fermentation, and being afterwards cover'd or disguis'd by the acid particles of the Vinegar, were againe extricated by distillation, the Acid salts having fixt themselves upon the Lead they corroded, and thereby given the Spirits leave to forsake them: If I say, this be objected, I might refer you to a more full answer that I have elsewhere given. And at present it may serve the turne, that I put you in mind againe, that the Objection alledges no *Phænomena* to make appeare the actuall pre-existence of vinous spirits, either in the juice of Grapes, or in the solution of Lead.

And though I need but deny what is barely affirmed, not proved; yet

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to examine this matter further than I had found others to have done, I did (as I elsewhere mention) make a *Saccharum Saturni* with an Acid liquor made without Fermentation, or the Addition of any liquor, from Wood it selfe; and then, distilling it also without any Additament, I had, (as I expected) a Spirit that readily took fire and burn't away in a blew flame, like that of Spirit of Wine. I know another Objection may be framed from the doctrine of some Chymists, who would have Spirit of Wine to consist of the oyley parts of the juice of grapes rarefied and subtilized. But with these learned Men for such I know some of them to be) I have not here any need to enter into a dispute, since, without examining whether their opinion be true or no, if it be admitted, it will be consistent enough with mine. For to say, that by subtiliation, rarefaction, a peculiar kind of Commixture with the Phlegm, or the like meanes, the oyle contained in the Juice of Grapes, (and seperable from it, in the forme of Oyle, if

It be distill'd before it be fermented;) becomes Spirit of Wine, is but to assigne the *Modus* whereby Vinous Spirits are produced, but not to deny there Production. And all that my purpose requires, is, that it be proved or granted, that Inflammable Spirits are really produced, by what way soever they come to be so. I shall add, that though experience Witnesses, that Honey being skillfully fermented with a due proportion of water, will yeild a greater plenty of inflammable Spirit than the Wine it selfe, that is made in diverse Countries, yet when we have carefully distill'd Honey before fermentation, it afforded us a great proportion of considerably acid Spirit, that would dissolve some Metalls, but so little oil, that the paucity seemed strange, and made it appear unlikely enough, that so inconsiderable a proportion of that liquor, should be rarefiable into so much ardent spirit, as may be obtain'd from well fermented Honey.

The

The II. SECTION.

Of the Production of Urinous Spirits.

I Proceed now to the other sort of Spirits, as those of Hartshorne, Blood, Sal-Armoniac, soot, of wood &c. That we have formerly call'd *Urinous*, because of their great affinity in many Qualities, to the more familiarly known liquor, *Spirit of Urine*. But as for these, I know not, whether it will be necessary to treat of their Origine apart; since, for ought Experience has yet assured me, these Spirits are not simple but compounded bodyes, consisting of the Volatile salt of the Concrete that afforded them, dissolv'd in the Phlegm, and for the most part accompanied with some little oil, at first undiscerned by the Eye though afterwards it grow Visible. The presence of this Oil in most Spirits, belonging to this family, may be probably argued from the deep Tincture

Sure that in procelle of time, spirit of Hartshorne, of Blood, and diverse other subjects, will acquire by standing, though presently after their distillation, and First or second Rectification, they were cleare, and colourless as water: The oily portion, which, whils't 'twas in very minute particles, lay conceal'd, in the mixture, becoming discoverable in procelle of time by their extricating themselves a little, and associating, though not so farr as to emerge and floe, yet far enough to disclose themselves by the colour they give the liquor. But in Spirit drawn by the help of an *Alkali* from *Sal-Armoniac*, a Concrete not abounding in oily parts, like Hartshorne, blood &c. kept not only for many months, but diverse yeares, I observed no such discolouration, which was one inducement to make me, in speaking of the Oleaginousness of Urinous Spirits, to employ the word *most* rather than the word *all*.

Having therefore hitherto by Rectifications and Digestions observed nothing in these *Urinous Spirits* but a *Christalline Volatile Salt*, most commonly

monly sepa-
rable in a dry forme, and
the *Phlegm* it was dissolved in, besides
some *Oleaginous Particles* that had
(though at first unperceivedly) asso-
ciated themselves to it; I see no great
need to trouble you, with particular
Instances about this sort of Spiritu-
ous liquors; what has been said,
making it allowable for me to referre
you, to what I deliver about the
Production of Salts, where that of
Volatilè ones is mention'd.

The

The III. SECTION.

Of the Production of Acid Spirits.

AS for *Acid Spirits* that some of them may be generated or produc'd *de Novo*, seems probably deducible partly from what has been already delivered (in the first part of these notes) concerning the Production of *Acid Salts*; and partly from what will be ere long recited of *Acid* as well as of *Urinous* and of *Vinous* Spirits, obtain'd by distillation from one and the same body. And if we take the word *Acid*, as I usually do in these notes, in a familiar sense, without Cryptically distinguishing it, from those savors that are a kin to it, perhaps the spirit of sea-salt and that of Nitre may be fitly enough propos'd as Instances of the production of Acid spirits. For though *sea-salt* and its distill'd liquor have upon some bodies the like operations;

as either of them will precipitate silver out of *Aqua fortis*, yet not only the taste of the spirit of *salt* (especially that which rises last in distillation) is exceeding different from that of crude salt, not only in strength and penetrancy, but in this, that, the spirit is highly acid: Whereas the crude salt has a taste not properly acid, but that which by a distinct name is in *Latin* commonly call'd *Salsus*, such as that which predominates in Brine; and it does not appear, that this acid spirit did as such preexist in the salt whence it was obtain'd, so that we may suppose it to have been made rather by transmutation, than extrication. And the like I think may (and that with greater probability) be said of the spirit of *Nitre*; for though this be highly acid, yet the *Nitre* that afforded it is not at all sensibly acid; and this new vehement taste of the spirituous parts, as well as their great efficacy in dissolving Metals, and divers other bodies, seems to have been produc'd by the Violent action of the fire, (agreeably to what I formerly noted) see Part
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which by cleaving the Nitrous corpuscles, or by rubbing them one against another, or by both these wayes, and perhaps by some others, makes a comminution of them into fragments or particles, which both because of their smalness and lightness may be elevated by the action of the fire, and because of the same Minureness and their sharp and pointed figures may gett into the Pores of many other body's and divide their parts. I know that Chymists may object, that all the Acid spirit that can be distilled from Nitre, was really pre-existent in it, and only clogg'd and disguis'd by the *Alcalizate* Ingredient. Wherewith it was associated, as may appear by what I my self relate of the speedy way of making *Salt-Peter*, by putting a due proportion of the spirit of Nitre to the *Alkali*, or six part of Nitre, that remains, after the *salt-peter* has been fulminated or burned. But to this I answer, that this proves indeed, (what I readily grant) that *Salt-peter* may be Artificially compounded of a Nitrous Spirit and a fixt *Alkali*, but does

does not prove that Nature does al-
ways, or so much as ordinarily pro-
duce Nitre by the same wayes, that
is, by compounding it of the same
Ingredients & for it does not appear,
that wherever *salt-peter* is generated
in the Earth, Nature has before hand
laid in a provision of Lixivate Salt,
which (at least in these Countreys)
is not wont to be made without
the violence of an incinerating fire
and of Corrosive Spirits, to obtain
which or either of them, Artists are
fain to employ Vehement fires; where-
as it seems that *salt-peter* is slowly
generated in the Earth by gradual
or successive Alterations of some In-
doneous Matter, wherein for ought
I have observed, not an *Acid* but an
Urinous salt is predominant, as may
be made probable by what I have
formerly related about Earth, that
had long lain covered with pigeons
dung in a dove-house, which I found
a Destillation to yeeld a *Volatile* spi-
rit and salt, much like those of U-
rine. Therefore I will not affirm,
that Nature does never employ *fixt*
Alkali's and *Acid Spirits* to make
F 2 *salt-*

salt-peter, yet I see not that Chymists have hitherto given us, or perhaps offer'd us any cogent proof, that she must necessarily do so. I further observe this more considerable Argument, that, according to what I formerly noted, *salt-peter* destill'd in close Vessels afforded us but an inconsiderable quantity of fixt salt, and that too, was but a very imperfect *Alkali*; though the quantity of *Nitrous Spirit* was great enough to perswade us that not any thing near so much as was wanting of the entire weight of the *salt-peter* had pass'd into the Receiver. And elsewhere I relate, that a freind of mine with the helpe of a peculiar Clay obtain'd neare a pound of Spirit of *Nitre* from a pound of *salt-peter*; whereas on the other side by a differing way of Managing it, and without Additament, obtain'd, as I there relate, about six ounces of fixt *Nitre* from a pound of *salt-peter*: whence it seems probable, that the same substance in crude *Nitre* is almost insipid, may by an operation of the fire be

still'd into a highly *Acid Spirit*, as well as, by another operation and way of management, be brought into the nature of a fixt and Caustick *Alkali*. It may also be worth considering, whether the Spirits of *Nitre* themselves, when after being made *sui juris* they compose a distinct liquor and are specificated, may not be depriv'd of their *Acid Nature*, and may become or at least materially concur to make up a fixt *Alkali*: For if sea-salt, which Chymists do not pretend to contain any such *Alkali*, be thorowly dissolved in a sufficient quantity of *Spirit* of *Nitre*, and impregnated, this compounded salt will, as I have formerly noted, yeeld a considerable proportion of fixt *Alkali* like that of *salt-peter*, which is as likely to proceed from the Nitrous, as from the ~~Marine~~ part of the resulting salt; and if it do, it will make it the more probable, that it is not necessary, that the saline corpuscles of *Spirit* of *Nitre* should be primordial bodies, since they may be destroy'd or turn'd into o-

ther salts, which is not less repugnant to the nature of a *Principle*, than 'tis to be *De Novo* producible from a body that was not *Acid* before.

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The IV. SECTION.

I T may add much probability, to what has been above discoursed, concerning the producibleness of the differing sorts of *Spirits*; if it shall appeare, that the same body, meerly by different wayes of ordering it, may be easily enough brought to afford, either *Acid*, or *inflammable*, or *Volatile* commonly called *Urinous* spirits, as the skilfull Artist pleases.

An Instance of this may be afforded us, by some *Legumen's*, as Pease, or Beanes; which if they be newly gathered and distilled in a Retort, 'twill I presume be easily granted, that they will like many other green vegetables afford, besides a great deal of Phlegme, an Acid Spirit, and if I much misremember not, I had such a spirit from either pease, or beanes, or both, after they had been kept long enough to loose their verdure: But if these seeds be at a fit time duly fermented with common water,

I thinke it will not be doubted, but that they, as well as other mealy seeds, will yeild an ardent spirit, but it will not so easily be suspected, much less beleev'd, that without adding any thing to them, or meddling with them, barely by keeping them in a dry place, for a certaine number of months, they will yeild a spirit that by one, that did not know whence it proceeded, would be judg'd near of kin to the spirit of *Urine*, or of *Harts-horne*, and to other saline liquors drawn from animall substances; for having distill'd these *Legumen's* by themselves, without any additament, and without so much as breaking them, they afforded me spirits, not only far more like in smell to those, I have compar'd them to, than they were either to *Acid*, or *Vinous* Spirits, but very like them, in more intimate qualities: since they would, as the Spirit of *Urine* and *Harts-horne*, make a conflict with *Acid* spirits, turne Syrtrope of Violets greene, dissolve Copper blew, precipitate a solution of sublimate into a white substance, and in a Word performe

performe those things, which I many yeares ago delivered in the Tract about Colours, and severall ingenious writers have since embraced, as the distinguishing markes of *Volatile* and *Urinous* salts, or spirits. I say *Salts* or *Spirits*, because I found that these drawn from Vegetables, as well as those afforded by Animalls, may easily by a dexterous sublimation be brought to exhibit many of their nobler parts in the forme of a dry salt, as well as in that of a spirituons liquor.

Another instance I shall take from the juice of grapes, though Chymists will perhaps thinke it strange, that I should undertake to accommodate it to my present purpose, but there is no great mystery in the business, for the fresh juice of grapes or must, though sweet in taste, will if it be timely distill'd to the Consistence almost of a Syrope, yeild a copious flegme, but not an ardent Spirit: if the superfluous moisture be skilfully evaporated, there will remaine a kind of *Rob* or *Sapa* of a pleasant tartness, which I have known used in some places, (as especially in, or
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neare *Switzerland*,) for an excellent ingredient of sauces, and also, to be spread upon bread to be eaten instead of butter.

But if this *Raisinee* or *Sapa* were presently distilled, I suppose it would yeild no *Vinous*, but an *Acid Spirit*: I said, *I suppose*, because for want of Vineyards in *England*, I could not examine any liquor taken out of great Vessells of Must, and therefore cannot say precisely and experimentally, what distilled liquors it would afford; since I know not certainly whether the great quantity of the sweet liquor, and its continuance for some time (though not a long one) in the state of what they call *Must*, may not somewhat alter it's productions, but if, as it is probable, that diversity be not considerable, I may safely suppose, that the *Vinous* spirit afforded by the Juice of Grapes, after fermentation has turned it into Wine, is a produced thing, and was not in that forme preexistent in the Juice; for having purposely caused ripe grapes to be moderately press'd, that their Juice may without much dreggy matter

matter be Squeezed out, we put this liquor into a glass head and body, and distilling it with a gentle fire, we obtained a scarce credible proportion of flegme: And then transferring the somewhat inspissated remainder into a Retort, after having kept some of it (which had a grateful mixture of sweetness and acidity) for *Raisnee*, we prosecuted the distillation with a stronger fire, and obtained not a *Vinous*, but an *Acid* Spirit, as we found not only by it's smell and taste, but by it's corroding fragments of Corall, even in the cold, by it's growing sweet upon *Minium*, &c. Agreeably to which experiment I found by tryall, that *Raisons*, which consist chiefly of the Juice of Grapes, inspissated in the skins or huskes by the avolition of the superfluous moisture through their pores, being distill'd in a Retort did not afford any *Vinous*, But rather an Acetous Spirit, that, as an *Acid* liquor, would worke upon diverse bodies, as spirit of Vinegar would have done, and yet as it was formerly noted, 'tis known that *Raisons* being

ing in a due proportion fermented with common water will after a certaine time afford a *Vinous* and inebriating liquor; and though this time in the better sort of the knowne wayes, of making artificiall wines, is wont to amount to many months, yet I have practised a way (which consists chiefly in a determinate proportion of the water to the *Raisons*,) by the help of which the liquor in very few weekes becomes fit to drinke, and consequently to afford by distillation a *Vinous* spirit; but this only upon the by.

I shall now add, which probably you will thinke somewhat strange, that from the Juice of Grapes even after it has been duely fermented, there may be Obtrained a distilled liquor, which having not found mentioned in Authors, I thought that I might take the liberty to name, and upon the account of it's taste, and some other qualities to call it the *Acid spirit of Wine*: to satisfy you therefore, that there is such a liquor, I will not make use of *Rhenish* wine or other wines, that are thought to
relish

relish of Acidity, but I will acquaint you, with an Experiment that I chose to make upon Sack, as a Wine fully ripe, and more remote from an Acid and Tartarous nature, than those are wont to be, that are made in less hot Climates. We tooke then some good Sack, and having a digestive Furnace, and in a glass-head and body slowly drawne off the Ardent spirit first, and then the Phlegm, (which even in this generous Wine was copious) till there remained a liquor of the consistence of a somewhat thin syrup, we removed it into a Retort, and distill'd it by degrees of fire, whereby we obtained, besides a sourish flegme that came first over, a true acid spirit, as appeared not only by the taste, but by the hissing noise and numerous bubbles that were produced, when we poured it upon a Lixivate salt, as also by this, that having put it upon powdered Coralls, it began briskely to dissolve them, even in the cold; we likewise made it corrode some metalline, and minerall bodies, of which 'tis not here necessary to give you an account, no more than

than of the black substance that remained after the distillation; only two things I will here intimate about them. The one, that as this Acid spirit of Wine has its origination differing from that of other known Acid spirits, and even from spirit of Vinegar, so I thought it not irrationall to conjecture, that it might have some peculiar qualities, whose discovery I leave you (if you think it worth the while) to prosecute: only by way of encouragement, as well as hint, I shall tell you, that having put some of it, for a certaine reason, upon filings of copper, in such manner that some of them, after being wetted with the spirit, should remaine expos'd to the Aire, and others lye beneath the liquor, I found though the tryalls were made in the cold, that in a day or two, the exposed filings had gained a fine blewish green colour, but the spirit that swam upon the other filings, did in few hours acquire a fine redness, which afterwards in two or three dayes degenerated into a colour, like that of the exposed filings. The other thing I will

will note, relates to the *Caput Mortuum* of the distilled Wine, which I found a more fixt body than one would have expected, and it is that though probably the finer part belonging as to other Vegetable mixts, so to the Juice of Grapes, being attenuated and subtilized was changed into an ardent spirit, and therefore appeared not in the distillation, in the forme of Oyle, yet 'tis not unlikely that the courser part of the oleaginous substance remained still in the *Caput Mortuum*: for holding it in the flame of a Candle, I observed that it would partly exhale in thick smoke, partly melt, and as it were fry, and and partly burn with an actual flame, which was not only continued while the flame of the Candle cherished it, but would after it was removed from the Candle, continue a pretty while in flame upon its own account, and a parcell of it, being cast upon quicke, (but not upon flaming) coales, burned with a blaze, almost as if it had been Amber, or Bitumen. I could here tell you, of fine *Chrystalls of Wine*, that I many yeares

yeares since made by a peculiar way, of the above mentioned extract of Sacke, but this may be elsewhere more fully mentioned.

To returne therefore to our Juice of Grapes, we see that meerly by a seemingly slight difference in the management of it, it may be made to afford either a *Vinous*, or *Acid* spirit, and I shall now add, that it may also be brought to yield a *Volatile* or *Urinous* one; for 'tis known that in process of time, Wine affords *Tartar*, and though Chymists suppose the spirit of *Tartar* to be of a quite differing nature from that of *Vine* and of *Soot*, and though I have elsewhere shewn that *Tartar* distilled the common way affords a double spirit, namely an *Acid*, and another that I thought fit to call *Anonymous*; yet I elsewhere show that by a peculiar and slow way of operating, I have been able to obtaine (though perhaps not constantly) from crude *Tartar*, without any Additament, a spirituous substance, that in taste, smell, and divers manifest operations, much more resembled the *Volatile* spirit of *Urine*.

or rather that of *Soot*, obtained as mine of *Tartar* was, by meere distillation, than an *Acid Spirit*: with which (so little did they agree) it was disposed to make a conflict as soon as they were put together. But such a kind of *Volatile* substance may be far more easily obtained from the Lees of *Wine*, than from *Tartar*; for having been accidentally informed, that an expert Chymist in *Germany* had found the way to get store of *Volatile Salt* from lees of *Wine*, I resolved to try whither it might not be done without any addition, and having procured some of the best lees (I could get) of *Rhenish* *Wine*, I caused them to be exposed in broad Vessels to the Sun, and the free aire, (which circumstance yet I am not sure is necessary) that they might leasurely be dried, if not also be impregnated in order to the *Volatility* of their saline parts. Then these dried *faces* being carefully distilled in a Retort by degrees of fire, the liquor was slowly rectified, by which meanes there ascended before the Phlegm a spirituous
part;

part, which would turne Syrup of Violets greene, precipitate dissolved sublimate into a white powder, soon colour it selfe upon Copper with a deep blew, and in short do several things, by the performance of which we have elsewhere distinguished *Volatile Salts* and Spirits, from *Acid*, and from *Vinous* ones. By all such Tryalls upon the Juice of grapes, we may inferre the truth, we intended to prove by them, namely that the same matter as it is differingely managed, may be made to afford an *Acid* (besides one that is truly *Acetous*) a *Vinous* and a *Volatile* spirit: besides that, *ex abundanti* it may also be made to yeild, as I have noted in mentioning the distillation of *Tartar*, another sort of spirituous substance, as yet *Anonymous*.

The

*New observations about the Adiapho-
rous spirits of Woods and divers
other Bodies.*

AND now having said upon the mentioning of this sort of spirits that I have call'd *Anonymous*, since I Remember not that the notice I gave the Publique of them * has engaged ^{* This was done in the} any writer to examine them; I am ^{Sceptical} content on this occasion to touch upon ^{Chymist} some of the more quicke and easy tryalls that I have made about this kind of Liquors, that I may both excite and somewhat assist the Curiosity of those enquirers, that shall attempt to make a farther discovery of the nature of these spirits, which when I first separated from the Acid spirits, where- with Chymists had before confounded them, as stilling them and taking them to be meerly the Acid spirits of *Tartar, Wood, &c.* their properties were so little known to me; that I contented my selfe to stile them *Anonymous spirits*: but since having found

them to differ in divers qualities, both from *Vinous*, from *Acid*, and from *Urtinous* ones, and having not sufficiently discovered their positive properties; I was wont to give them a negative appellation, and call each of them the *Neutrall* or *Adiaphorons* spirit of the body that affords it (whether it be *Tartar*, *Wood*, or any other like concrete.)

But before I descend to particulars, it will not be improper to premise in generall, three or foure things not unfit to make way for the observations that are to follow them.

1. I know not whether it will be requisite to repeat in the first place, that our *Adiaphorons* spirit may be obtain'd by distilling the Liquor that is afforded by Woods and divers other bodies, by *Distilling this Liquor* I say from Coralls, or calcin'd Lead, for by this meanes the Acid corpuscles of the *Menstruum* will worke upon the Corall or the Lead, and so fasten themselves to what they corrode, that they will easily enough part with the *Adiaphorons Spirits*, which by this meanes are permitted to ascend by them.

themselves, and fall into the Receiver, in the forme of a liquor. This, as I was saying, I know not whether it be necessary to insist on in this place, because I have already mentioned it in another paper: but I think it may be very pertinent to relate here, that I endeavoured to try whether there was not a difference in gravity or fixedness between the *Acid* and *Neutrall* spirit of Wood, without mortifying the first, and whether by the help of this gravity and fixedness I might not be able to separate, at least in great part, the *Acid* from the other, and so preserve it in its distinct nature.

In order to this, I caused a pretty quantity of the rectified spirit of *Bar* to be slowly distill'd in a glass Body and Head plac'd in a sand cappel with the flame of a Lamp, as that which would give a more gentle and regular heat than Charcoal, as indeed in the first 24 houres or thereabouts this furnace afforded but about two spoonfulls of liquor, and though the *Mensurum* first put in scarce exceeded by our guess one pint or pound (if it were so much) yet it was divers dayes

and nights in drawing over. And in this operation the next observable circumstances were these two. 1. that the liquor that first ascended was not Phlegme, but had a very penetrant taste, yet without any manifest Acidity, discoverable by the tongue, though by putting it upon fine powder of Corall (whether crude or calcin'd I remember not) yet had some operation that made mee think it not altogether devoid of Acid partcles. Secondly having often shifted the Receiver, the better to judge whether the portions of the ascending spirit were considerably different in quantity, I found that towards the latter end the liquor that came over was sharper than before, and having at length distill'd all I could make to arise, we found the last parcell of liquor (which was copious enough) to be of a good yellow colour, (though those that preceded it were limpid enough) and both to smell strong of Vinegar, and to taste more acid upon the tongue than spirit of common Vinegar it selfe: so that if I had not known how it was obtain'd, I had suspected

suspected it to be what the Chymists call *Acetum radicum*, and accordingly I found it to be a very active *Mensuum* in the dissolution of some body's that for tryalls sake were put into it. All which seems to argue, that the Acid portion of such distill'd liquors as I have been speaking of, is more ponderous, or more fixt than the *Adiaphorous* spirit which upon this account may be in great part separated from it, by bare distillation, if it be warily enough made.

My second generall remarke shall be, that I have observ'd these *Neutrall Spirits* to be not all of them in all things of the same nature, since though they agree in some generall attributes, which suffice to entitle them to the same species or denomination, yet they sometimes differ from one another in particular qualities: which advertisement I thought it necessary to premise, that it may not seem strange, and that I may not be blamed, though some of the tryalls I shall set downe do not punctually succeed in their hands, that shall not make use of the *Anonymus* spirit of *Box*, which I employ'd;

not because I think it better than any other, but because amongst divers that I have made use of, I had then a greater quantity of it at hand. But though for this reason, when I shall speak what I have observ'd in an *Adiaphorom* spirit, without naming it, I would be understood of the spirit of *Box*, which I had freed from its Acid mixture by distilling it from calcin'd Corall, yet I shall not so confine my selfe to this, as not to mention now and then, some other spirit of the same family.

The third generall observation that I shall make about our *Adiaphorom* spirits, is, that though the few Chymists that have taken any notice of the distilled liquors, for example, of *Woods*, were wont by reason of their Acid tastes to looke upon them, as of a meerly Acetous nature, and having accordingly call'd them the Vinegars or Acetous spirits of Wood, yet really the Acid portion of these distill'd liquors, is far from being the greatest: for besides what other tryals I have purposely made, I remember I took eight ounces of the rectified spirit

spirit of Box, wherein the Acetous and neutrall spirit remain'd confounded, as they had been in the first distillation, and having poured this upon a quantity of Calcin'd Corall, sufficient to satiate the Acid Corpuscles, (which quickly fell to corrode it with noise and bubbles) we gently distill'd it to a dryness in a glass head and body, by which meanes we obtained of *Adiaphorous* spirit, but eight grains less than seven ounces and an halfe, and some of the *Menstruum* having been wasted in the operation, the Acid corpuscles remaining in the bottom with the Corall they had corroded, weighed but between two and three drachmes; which shews, that notwithstanding the not contemptible quantity of strong spirit of Vinegar, that by our lately recited observation the distilled liquor of Box do's containe, the Corpuscles that make it so Acid being concentred, take up but a little roome. And since it was rationall to suspect that the Acetous Corpuscles being made without fermentation, might have something peculiar in their nature, I caus'd them

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to be gradually distill'd with a stronge fire from the Corall, and thereby obtained a very red spirit, of which, though many Chymists would take it for a *Volatile* tincture of Coral, I shall only observe, that its smell was very stronge, and its taste exceeding penetrant, but very differing from that of *Acid liquors*.

Whether our *Adiaphorous* spirit may (as I sometimes suspected it may) be generated, by a commixture of the finer parts of the oyl of the wood reduc'd to an extraordinary smallness, and thereby capable of being exquisitely mixt with the Phlegme, and strictly associated with it's particles, I shall stay till I be better furnished with experiments, before I venter to determine.

Having premis'd the foregoing generall observations, I shall proceed to particular ones, as soon as I shall have advertis'd you, that for the better discerning the *Phanomena* to be produc'd, I chose to make almost all the following tryalls in Cylindricall glasses of about an inch in Diameter.

To the *Phenomenon* I am about to take notice of, I therefore give the first place, amongst those produc'd by the help of our *Adiaphorous* spirit, because 'tis uncommon and not unpleasant: for though we have many Experiments of the suddain *transmutation* of colours, whereby we change one into another, yet we have very few of the production of colours *De Novo*, in body's that were colourless before. And I remember not, that the writers I have since met with, have added any Experiments of this kind, to those three or foure that I have mentioned in the *History of Colours*.

1. I shall begin then with observing, that having into our *Adiaphorous* Spirit of Box dropt a convenient quantity of stronge and transparent oyle of *Vitriol*, and shaken the liquor together, there presently emerg'd a rich and lovely red colour, which at first was *Diaphanous*, but afterwards grew so deep, that it was opacous, though by shaking the glass, the thin liquor that would slowly glide downe the inside of the glass, being

being held against the light, manifested, that the colour was still red, though much more darke and muscadine-like than before.

2. Some common *Aqua fortis* being put to our neutrall spirit and shaken a little with it, presently gave it a rich Amber or high yellow colour, but not a true red: but if the liquors were not mingled by Agitation, the spirit did but slowly and gradually obtaine the above mentioned colour, which was somewhat deeper than that of Sacke; after this change the liquor continued transparent, and (which is a circumstance not to be omitted) the change at first was wrought without any manifest precipitation, though afterwards, when the mixture had rested a good while, there appeared some little and light feculency at the bottom of the glass, and the inside of it, as far as the liquor reached, was sullyed with a cloudiness not easy to be washed off. One circumstance more of this tryall I must not omit, which is, that notwithstanding the strong and offensive smell that is wont to be justly complained

plained of in *Aqua fortis*, in our mixture it was either none or but very faint, being conceal'd (if I may so speake) or suppressed, and partly perhaps disguis'd by the predominant odour of the *Adiaphorous* spirit.

3. Some spirit of *Salt* being mingled with our spirit of *Box*, the mixture became much less *Diaphanous* than the liquors had been before their conjunction, and for a day or two was only whitish, but when we removed it into a digestive furnace, and kept it there for many houres, it acquired a colour high enough, partaking of browne and yellow, and appeared to have let fall some little sediment to the bottom of the glass.

4. Having put some of our *Adiaphorous* liquor on salt of *Tartar* it had not any sensible operation on it that we tooke notice of, save that it dissolved the salt, and after some digestion appeared of a yellow colour tending to browne, and fastned to the inside of the Phiall in many little graines of Salt, that seem'd to have been first dissolved and then coagulated.

ted againe in newly emergent figures.

5. Our *Adiaphorous* liquor being confounded with high rectified spirit of *Wine*, neither of them appeared to change colour much (for some change there was towards yellowness) or be opacated by their conjunction, even after some dayes digesting; but the *Vinous Spirit* did not hinder the other from being turned red by the action of some potent *Acid*, when it was poured on the mixture.

6. Rectified spirit of *Urine* being put to our *Adiaphorous* liquor did not make any conflict with it, but joined with it quietly, as the above mentioned spirits had done, and did not manifestly change the colour of either of the liquors, whiles they were kept many hours in the cold, but being transfer'd into a digestive furnace and kept there a night or two, the liquor acquired a high colour, which was almost Orange-browne, and there appeared some little *facts* at the bottom. Having made these tryalls upon our spirit with simple liquors,

liquors, I thought fit to make some with such compounded liquors, as the solution of Metalls are, to see if our spirit, though neither manifestly of an *Acid*, or an *Urinous*, or a *Lixivate* nature, would procure precipitations of any part of the dissolv'd Metalls.

7. In prosecuting this enquiry I dropt into some of our spirit, a little solution of refin'd Gold, which at first imparted there to it's own colour (perhaps somewhat hightned) but the mixture quickly lost it's transparency and grew muddy, and after a while let fall a considerable quantity of sediment or Precipitate, the supernatant liquor having acquir'd a brownish colour.

8. Having mixt our spirit with a good solution of crude *Lead*, made with an appropriated *Mensstruum* that dissolves it readily and cleare, almost as *Aqua fortis* does common *Silver*, the mixture presently grew muddy, and at length after some dayes let fall a copious sediment, over which swam a liquor between brown and red.

9. We

9. We put to our spirit of Box some fine ceruleous tincture or solution of Copper, made with an Urinous spirit, (as of putrified Urine or Sal Armoniack) and soon perceived the mixture to grow troubled, which afforded us, though but very slowly, a copious residence.

10. We mingled with our spirit a convenient quantity of strong infusion of *Sublimate* made in faire water; but found not any manifest reaction betweene those liquors, no more than we did between dry and undissolved *Sublimate* and the same spirit, when we kept them together in this same Phial.

11. Mixing our spirit with oyle of *Tartar per deliquium* there did not suddenly appeare any manifest change, but having digested the mixture for severall dayes, there precipitated a light feculency, and the supernatant liquor, which was transparent, appeared of a colour inclinable to red.

12. We also mingled with some of our spirit a convenient quantity of *Vitriol of Copper* dissolved in faire water, till the liquor seem'd satiated with
the

the Vitriol, but I remember not that in some dayes, the solution grew manifestly opacous or discoloured.

13. We put to our spirit a solution of *Tin*, made in a *Mensstruum* that dissolves it cleare, and found very little alteration to ensue, though we left the liquors many houres together.

14. But when I put to our spirit a convenient quantity of the solution of *Mercury*, made in *Aqua fortis*, the colour of the mixture became first deeply yellow, and in a minute or two intensely red; and being digested for some dayes, I found at the bottom of the Phial a white Precipitate, much more copious than I expected, and the transparent liquor, that swam above it, was of a rich golden colour; whether Physitians or Surgeons should thinke fit to employ this Precipitate, or this tinged liquor for Medicinall purposes, I shall leave them to consider.

15. Severall of the foregoing Experiments were tryed with the spirits of other Woods than *Box*, and in particular with those of *Oake* and *Guajassum*, the *Prænomina* of which Experiments

riments were not alwaies the same with those above recited, which may probably argue some difference in the nature of such spirits, as well as there is in the constitution of the Woods that afforded them; nor for certaine reasons have I thought fit to recount here all the tryalls I have made with the *Adiaphorouse* spirit of Box it selfe, of which sort I shall for example sake name only two, which I remember as having been the latest I made, whereof the *first* was, That having put some of our neutrall spirit upon some pieces of fine red Corall, and kept them there many dayes, the liquor did not appeare to have extracted any tincture from them, though the upper part of the highest fragments seem'd to be turn'd white. And the *other* was, That having taken a parcell of spirit that came over by rectification in a Lamp furnace long before the more fixt Acetous spirit came to ascend, and having purposely expos'd a Phiall scarce halfe full of it, in a very sharpe frosty night in a Garden covered with Snow and Ice, it was taken up the next morning

ning, not at all frozen, but less
limpid than before, and this little
opacity did (somewhat to our wonder)
remaine more or less for some weekes
after.

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The



The third Part.

About the Producibleness of Sulphurs.

THose substances, that Chymists are wont to call the *Sulphurs* of the mixt bodies, that by the help of the fire are brought to afford them, are not of so uniforme a Nature as might be expected in the portions of the same Principle. For as on the one side Chymists make *inflammability* to be the constituent Character of *Sulphur*, so on the other side, 'tis obvious enough to those that are any thing vers'd in *Spagiricall* operations, that there are at least three substances manifestly differing in Consistence, Texture, or both, that, according to the notion lately assign'd

assign'd, ought to be referr'd to *Sulphur*. For *sometimes* the Inflammable substance, that is obtain'd from a mixt body by the Intervention of the Fire, appears in the forme of an oyle, that will not mingle with water; *sometimes* in the forme of an ardent spirit, that will readily unite with that liquor; and *sometimes* also in the forme of a Consistent body, almost like common *Sulphur*.

Notwithstanding these various formes, in which it appears 'tis not impossible but that in *many* mixt bodies, not to say in *all*, what is call'd *Sulphur* may be no Primordially Ingredient, but rather a Generated or Resulting thing. For that which is common to these differing bodies, that pass under the name of *Sulphurs*, and which is the constituent quality (if I may so call it) that discriminates them from the other materiall Principles of mixt bodies, must be confess'd, if we will speake intelligibly, to be *Inflammability*, or if you please, a *disposition to be turned into Fire*, and usually also into flame. Which being premis'd, I con-

sider here, that *Sulphur* it selfe is made of the same Universall matter, whereof other Bodies consist, and is but a Coalition of certaine particles thereof, whose Aggregate, by having such a Contexture, Motion, &c. acquires those properties, for which a Body is called *Sulphur*. And therefore if the like contexture happen to be found in other Portions of matter, or (to express my selfe more fully) if Art, or chance can frame and bring together Particles of matter, and give them such a Contexture as is apt and sufficient to dispose them to be kindled and flame or burn away; These Qualifications of such an Aggregate of Corpuscles will suffice to conferr on it the nature of a *Sulphur*, whether this portion of Matter do, or do not consist, or copiously participate, of the Chymists Primevall *Sulphur*. For it is not by vertue of the long preceeding Duration of a thing, but by that of the Essential Qualities belonging to it, that a Body deserves this, or that Denomination. As the *Snow* that fell yesterday, and
was

was generated in a trice, is as true *Snow*, as that which has laine, perhaps for many years, on those *Alpes* that are alwayes cover'd with *Snow*, or on the highest Mountaines of the frigid zone. And in the Judgment of the Chymists themselves, a Pound of *Quick-Silver* recently transmuted by a graine or two of their *Elixir* into Gold, becomes as true Gold, as that which was coevall with the Mountaines, where nature has form'd the Ancientest Mines of that Metall.

The I. SECTION.

Of the Production of Oyles.

That 'tis not necessary, the Oyles or Sulphurs obtain'd by the Fire from mixt bodies, should be a Primævall Element or Principle, may be probably argued from the Experiment mention'd in the *Scepticall Chymist* about the Growth of Plants nourish'd by meer water, which nevertheless by Distillation afforded an oyle. And we see that in Almond trees, walnut trees, and divers others, the raine water, that insinuates it selfe into their roots, is by successive changes of Texture reduc'd into the Oyle which the Fruit by expression so plentifully affords. And to confirme our Experiment from the growth of Plants by transmuted or assimilated water, to obviate the suspition of common waters being impregnated with the grosser Juices of the Earth, I employ'd distill'd water. About which

which Experiment I find this short memoriall among my *Adversaria*.

[A Sprigg of Mint put into Raine water distill'd, and fed almost wholly with redistill'd Raine water weighed July 15. gr. 3. and was taken out August the 14. and being well dryed with Paper and a Cloath, weighed 10. graines and about a Quarter: So that within less than a Month it grew to be three times as heavy, as when 'twas first put in. Another put in, and taken out at the same time, with the former, had attained within less than a Month to near four times it's first weight, and had shoot out a second sprigg much higher than the first, and store of Roots, some of them near as long againe, as the whole plant when it was first put in]

If we consider what a great quantity of Oyle is afforded by an Olive-yard, whose Trees are probably, as well as those that beare Apples, Cherries, and other kinds of Aqueous fruits, nourished chiefly by Raine water, that being imbibed by the Roots is by various digestions, or preparatory changes, turn'd in-

to Oyl in the Olive, it will not appeare unlikely, that Oyle may be produced of other substances; since in our instance it seems to have been made by transmutation of water, though this be generally reputed to be of all Liquors the most contrary to it, and is evidently of a nature exceeding distant from it.

And here I shall relate an Experiment, by which I attempted to produce it, out of only two distill'd liquors, that according to the common estimation of Chymists are uncompounded Bodies, and whether they be really so or not, are each of them readily dissolvable in water, and in one another. Take then of Oyle of Vitriol, and of such spirit of Wine as is totally inflammable, an equall weight, mix them together by degrees, lest the heat they will produce should breed some inconvenience, and having digested them a good while (which yet is not absolutely necessary) with a very wary management of the fire (for else the Experiment will easily miscarry) draw off what will come over,

over, and if you goe to worke, as I have severall times done, you shall obtaine besides a subtile and odoriferous spirit of Wine and an *Acid* sulphureous Liquor, a considerable quantity of Chymicall Oyle, which I have had sometimes deeply colour'd, sometimes clear like faire water, and this Oyl you will perchance looke on as an odd liquor, when I tell you that I have had it, sometimes exceeding fragrant, and (though the oyl of Vitriol be so highly Corrosive) without any Acidity at all, the Taste of it being very subtile and penetrant, but no way like that of any saline liquor, that we know. This hath sometimes inticed me to doubt, whether it hath been made of the spirit of Wine, or of the oyl of Vitriol. The Circumstances last mentioned seem to perswade the former; especially if I add to them, that I found by Tryall purposely made that this oyle would readily mix with good spirit of Wine that had never had to do with oyle of Vitriol, but on the other side it seem'd considerable, that the
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oyle of *Vitriol* by this operation was much weakened and changed, and it appear'd not, whence the spirit of Wine should have so great a fragrancy, which considerations were back't by this more weighty Argument, that this Oyle was so ponderous as to sinke not only in common water, which is yet a far more heavy liquor than pure spirit of Wine, but in the *Acid* spirit it selfe, which seem'd to be the remains of the alter'd oyle of *Vitriol*, which, by reason of it's abounding in Salt, you will easily grant to be far heavier than Common water. But I need not much trouble my selfe, to determine, which 'tis of the two liquors, that affords this stronge oyle; for it may well be (though not equally) compos'd of both, by their mutuall Action, and the operation of the Fire, united in the forme of Oyle. And if it be objected as probably it will, that this inflammable substance is made but by extrication of the parts, that lay conceal'd in the liquors before they were brought together, it may be answered, that
this

this should not be supposed, but proved, which till it be our cause will be favour'd by our Experiment, wherein there appears nothing so likely as a Change of Texture; to which may be ascribed the Production of our *Anomalous* Chymical Oyle, since this plainly seems to result from two bodies whereof neither was a true oyle before. For each of them would readily mingle with water, whereas this produc'd oyle of our's, being shaken with water, would breake like common oyles, into numerous little globul's; which would presently after sinke to the bottom and reunite there into a liquor, which for Tryall sake I have kept diverse weekes in the water, and found it at last undissolved by it. Some odd property's of this oyl make it seem likely to participate of some of the nobler parts of *Vitriol*, and the sulphur of that Metall having extraordinary vertues ascribed to it, by some of the famousst and Intelligentest Spagirists, (as *Basilus Valentinus* *Helmont* &c.) I kept some quantity of this oyle by me for severall yeares, to observe,

as I did with pleasure, the alterations that time would produce in it, and afterwards I imparted either some of the Medicine it selfe, (whereof the first Tryal proved very successfull) or the wayes of preparing it, or both, to some ingenious Men, who (I am told) did not all of them remember me in the free mention they made of it.

But this concernes not our Argument, upon occasion whereof I shall observe upon the by, that though Chymists should be able to prove that our Oyl was but seperated from the spirit of Wine, or the oyl of *Vi-triol*, in which it was latent before, yet still the Experiment would afford me a considerable reason for questioning a maine point in the doctrine of the vulgar Chymists, who confidently pretend to prove from the number of similar substances (as they suppose them) obtain'd from a mixt body, that it was actually compounded of just so many distinct and true material Principles and such a quantity of each. For if from a distill'd Liquor, as the
oyle

oyle or rather ponderous and Acid Spirit of *Vitriol*, or from *Alcohol of Wine*, which is commonly reputed to be uncompounded, a liquor of quite another kind may be (not made but) separated, how little reason have we, to take it for granted with the Chymists, that every distill'd liquor, that they looke upon as one of the Component Principles of the Body that afforded it, is a *Homogeneous* substance not further divisible into differing parts.

The

The II. SECTION.

Of the Production of inflammable Spirits.

AFTER what has been hitherto delivered concerning the production of Oyles, I should now proceed to that of another sort of liquors, referr'd by the Chymists, to the principle they call *Sulphur*, though better known to others, by the Name of *inflammable Spirits*. But of these I shall purposely forbear to discourse in this place and rather refer to what I have said to them in another, where I thought it more proper to consider them; Namely, in one of the Sections of that part of these Notes, that treats of the producibleness of *Vinous Spirits*.

The

The III. SECTION.

Of the Production of Consistent Sulphurs.

I F you should here tell me, as perhaps you will do, that what I have been hitherto saying relates but to Inflammable liquors, whereas *Sulphur*, in it's most proper and primary Acceptation, Signify's a Minerall Body; I shall answer, that, as I formerly intimated, the Chymists use the terme *Sulphur* so ambiguously, and so uncertainly, that they have made it difficult for other Men's discourses to avoid all appearance of participating of the Confusedness, they seem to have affected in theirs. But because the most intelligible, and least indefinite Notion their writings suggest of *Sulphur*, is, that 'tis a Combustible and Inflammable Principle; I have hitherto treated of it as such. And as for that *Sulphur*, that is commonly known by that name, and bought in shops, though I know there are some

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Chymists

Chymists that have affirm'd, that from Vegetables and Animalls they can separate such a *Sulphur*; yet since they are not wont to teach us the way of doing it, nor give us any proofs besides there own word, of there having ever done it themselves, the thing has seem'd so improbable, that I find few or none of the more Judicious of their own Party, that looke upon it, as other, than a Bragg: only a follower of *Glauber*, I find to have undertaken, by his Master's directions, to produce a real *Sulphur*, like the Minerall, out of Vegetable Charcoal, by a way, which, because it has deceived more than him, and is specious enough to impose upon those that either are not Chymists, or, if they be Chymists, are not *cautious Men*, I shall here set down, and examine, as after the Author I made it.

We tooke then equall quantities (suppose a pound of each) of good oyl of *Vitriol* and of common sea-salt, dissolved in as much water as was requisite: This mixture was slowly distill'd till the bottome was
thoroughly

thoroughly dry; (which it will not be so soon as it begins to look white, or appear coagulated) then setting aside the Liquor, (whereof the first part that came over was Phlegm, and the other part spirit of Salt) we tooke out the *Caput Mortuum*, which if one pleases, may be purified by being dissolv'd and filter'd) and having beat it to powder with about $\frac{1}{4}$ or $\frac{1}{2}$ part of its weight of Charcoal, we put it in a strong Crucible, and kept the mixture melted in a Vehement fire, till it grew of a darke reddish colour, for by that time such a change was made in the Mass, that it both smelt and tasted rankly enough of Sulphur; and if spirit of *Sal Armoniack* were seasonably distill'd from it, with a competent, but not over hasty fire, the ascending spirit would be manifestly impregnated with *Sulphur* not difficultly separable, which may also be divers other wayes obtain'd from the same fixt *Caput Mortuum*.

But for all this specious operation, do not take the *Sulphur*, thus produc'd, to have been the Vegetable

Sulphur of Charcoal, but a Minerall Sulphur that lay conceal'd in a liquid forme among the saline parts of the Oyle of Vitriol.

For, *First*, 'tis not likely that so small a quantity of Charcoal, as was employed in this Experiment, and much less that so small a quantity as may suffice to make it, could containe so much Sulphur as may this way be obtained.

Next, that common *Vitriol* is not destitute of Minerall Sulphur, may be easily conjectur'd by the Sulphureousness of the *Marchasites* whereto 'tis wont to be made. In so much that in divers Countreys, as about *Liege*, and in some parts of *Italy*, from the same substance that affords them *Vitriol*, they obtaine by sublimation great quantities of common Sulphur, which is sold for such into divers other Countreys. And we have found by Tryall, and do not at all thinke my selfe in that singular that one may obtaine from *Vitriol* an oyle, and a *Caput Mortuum*, which being put together afforded a smell common Sulphur so strong, that

was scarce able to indure it.

And to come yet more close to our Experiment I have (as I have elsewhere mentioned) purposely tryed, more than once or twice, that by distilling together common oyl of *Turpentine* and common oyle of *Vitriol*, the former of whose liquors, would make a separation of some of the Sulphur that lay conceal'd in the latter, and as it were extricate and extract it: so that besides an exceedingly Sulphureous liquor, which sometimes was made white by the copiously dissolved (and partly precipitated) Sulphur, that pass'd into the Receiver; we had in the Necke of the Retort a yellowish consistent body, which being put upon a quicke Coal, would, after a little yellow flame (probably proceeding from some adhering parts of *Turpentine*) afford good store of Blewish flame, like that of common *Sulphur*, which it also emulated in it's smell. And such a kind of *Sulphur* I have also seen, in tract of time, settle it selfe, in no inconsiderable quantity, at the bottom of the Liquor, distill'd from the mixture of the two

above mention'd Oyles. Nor are these the only wayes, by which I have obtained from oyle of *Vitriol* manifest proofes of it's containing a *mineral Sulphur* very like to common *Sulphur*.

And in particular it now comes in to my mind, that I once put into a Retort, together with one part of running *Mercury*, four parts of oyle of *Vitriol*, and having distill'd off the *Mensstruum*, by degrees of fire, there remain'd at the bottome of the Glass a very white powder. This *Calx* being afterwards gradually prest with a stronger fire, afforded in the upper part of the Retort a great many small bodies, that look'd like halfe Beades of Amber, and seem'd to be of very fine *Sulphur*, (but were afterwards confounded with many other ascending corpuscles.) The Amber-like Body (which was somewhat copious and as to some portions of it whitish) by its readiness to be melted, by its smell and by the blewish flame it afforded when it burn'd, appeared to be a kind of *Sulphur*, which you will easily grant,

be far more unlikely to have proceeded from so Homogeneous a body, as the *Quicksilver*, than from the Oyle of *Vitriol*, which we have already shown to consist of divers Sulphureous as well as many Acid corpuscles. And on this occasion I remember, that, whereas upon mingling the oyles of *Turpentine* and of *Vitriol* in a due proportion, I have constantly observed, that they incorporated into a mixture, that was deeply red, (and this may easily be tryed by letting fall two or three drops of oyle of *Vitriol* upon some drops of that of *Turpentine*, and mixing them in a concave Vessell, or even in a hollowed piece of paper) whereas, I say, I observ'd this, I was thereby induc'd to suspect the Chymicall (for I say not, the Optical) cause of that *Phenomenon* might be, that the *Terebinthinate* Oyle had made a solution of divers sulphureous Particles it met with, in the oyle of *Vitriol*, and by that meanes acquired such a redness, as we see that common flower of *Sulphur* gives to the oyle of *Turpentine*, when 'tis dissolv'd

in it. And to examine this conjecture, I found that divers other Chymicall oyles, and oyle of *Aniseeds* it selfe, as remote as 'tis from redness, would presently acquire that colour, being carefully incorporated with a due quantiry of oyle of *Vitriol*. But this conjecture is propos'd only upon the by.

As for the *Sulphur* of Mineralls and Metalls, I confesse, I have not yett found enough, either in Chymists Bookes, or in my own Experience, to make me willing to speake Dogmatically about them. And this the rather, because first, as to the *Sulphurs* that are sometimes obtainable from some of the Mineralls, I thinke it may be doubted, whether they belong'd to those Mineralls as Essential Ingredients, or were only Corpuscles of Common *Sulphur*, perhaps a little alter'd, that were mingled in the bowells of the Earth, with other parts that are essential to the nature of the Minerall. As we see, that in native *Cinnabar* the Mercury, which according to Chymists is a compleat Metall by it selfe,

is so mix'd with another body, as not to be distinctly discernable till it be separated by the fire. And this *Cannabar* affords me an instance, the more fit for my present purpose, because I have sometimes by an easy way obtain'd a Sulphur also from it: and since we have lately noted, that the Vitriolate *Marchasites* afford great store of common Sulphur, by a gross way of separation, it should not seem irrational to suspect, that some common *Sulphur* may remaine more closely mixt with the saline and metalline parts of the Virriol afforded by the same *Marchasites*; from which Latent corpuscles of *Sulphur* may in part proceed, the sulphureous smell, and other like things that we have lately taken notice of in Vitriol, and it's oyle. And perhaps by the same consideration one may account for the sulphureous qualities that are sometimes to be met with in the Liquors that pass for the Vinegars of Minerall Bodies, and particularly *Antimony*; to which may now and then be added some metalline Oar's: since I remember, I have had such a sulphureous Li-
quor

quor from good lead-*oar*, that I had ordered to be purposely digg'd out of the Mine at *Minedeep*; and being put in close Vessells speedily convey'd to me. And that nature her selfe may blend an imperfect minerall with Lead, I have had occasion to observe by an *oar*, whereof the owner found a Mine; but not being able to discover what it was, desir'd me to enforme him. For this gave me occasion to consider the *Oar* (whereof I have yet a Lump by me) and to observe, that 'twas so differing from the other *oar*'s of that Country, that I did but diffidently guess, that 'twas a mixture that Nature had made of *Lead* and *Antimony*, till particular Tryalls had justified my suspicions.

But this is not all I had to say about the *Sulphurs* of Fossiles: For though I know that Chymists pretend to teach us wayes of Extracting the true *Sulphurs* of Mineralls, and Metalls; and Experience assures me, that a reall combustible *Sulphur* may be in a pretty quantiry obtain'd from *Antimony*; yet there are two scruples that suffer me not fully to acquiesce in what

what they teach. The first is this, That Chymists oftentimes deceive others and themselves too, by mistaking those things for the true *Sulphur* of Minerals, and Metalls, that really are not so: Of which I shall give a plaine instance in the preparation that many Spagirists deliver of the *Sulphur* of *Antimony*:

For when they have boil'd that Minerall in a strong *Lixivium* of Potashes, they suppose, that, as by the same operation, common *Sulphur* is dissolved, so the *Menstruum* seeks out, and takes up, only the Sulphureous Parts of the *Antimony*: And as common *Sulphur* is precipitated out of the *Lixivium*, wherein 'tis dissolv'd, by sprinkling on it Vinegar, or some other *Acid*, so they presume, that what is stricke down the same way from the solution of *Antimony*, made in the same *Menstruum*, must be the true *Sulphur* of that Minerall; in which they are confirm'd by the colour: And yet in reality, not only the *Sulphur* (supposing that there is one,) but the other parts of the *Antimony* will be dissolved by a strong

strong *Lixivium*, and the yellow powder, that is precipitated, is but a kind of *Crocus*, which will sometimes after a while (at least in part) subside of it selfe, without the help of an Acid. Nor do's it convince me, that such a Body obtain'd from a Minerall, or Metall, is its true Sulphur that it may be made to burne; for unless the colour and smell of the flame concurr, I shall be prone to suspect, that the inflammability may be apt to rise, partly from the great comminution made of the prepared Body, and partly from the additament employed in preparing it. For these two, and perhaps even one of them, may contribute so much to the inflammable disposition of a body, that little, or no true *Sulphur* will be necessary to make it burne. Of this I elsewhere give an instance in plates of Copper; from which an equall weight of sublimate has been distill'd: For the remaining Mass will melt and burne at the flame of a Candle, almost as readily as sealing Wax. And of these Instances I mention more in another paper, where I endeavour
to

to shew, that combustible and inflammable bodies may be made up of *of the* Parts or Ingredients, that singly had *Produci-* not such Qualities. And yet the con- *biency of* trary of this is supposed in the Chy- *Inflamma-* micall argument that inferrs from these Qualities, the presence of *Sulphur* in all those Minerall preparations, wherein they are found. Yet by this discourse I would not be thought to derogate, from the Medicall virtues, or other Utilities of such supposed *Sulphurs*. For they may be very usefull Concretes, though they be not true Principles; the finer parts of the Minerall being in some of these preparations extracted, and further divided, and perhaps very luckily associated with the finer parts of the Body, employ'd to act on them. By which meanes there may emerge new Concretes of great vertue and use. And therefore I intend not to derogate from those Metalline *Sulphurs*, which some Few Masters of Chymicall *Arca-* na reserve with great care among the chiefest they are proud of. And that you may the better
examine

examine these fine *Crocus's*, as I am apt to thinke most of them, and try both what they are, and what they do; if I can light on the Proesse, (for I dare not trust my Memory) I will at the end of this *Appendix*, impart to you a way of preparing some of those that are made of Metalls, those being accounted the most difficult as well as noble. And thus much I now remember of the Tryalls I made according to this way; That I employ'd not any *Acid Mensstruum*, or liquor made of any particular salt; but a *Neutral* or compounded salt; which whiles it was in actual fusion, would dissolve or corrode the very thinly laminated Metall.

I do not looke upon these substances as the true *Sulphurs* of the Metalls that afford them, but rather (as I lately intimated) suspect them to be a sort of fine *Crocus's*, and perhaps *Magistery's*; which by reason of the subtilty and sometimes Fixtiness of their parts, may prove usefull to considerable purposes both in *Alchemy* and *Physick*.

But there is another sort of Eody's obtain'd

obtain'd from some Mineralls, and perhaps from Metalls too, that has a greater resemblance to Minerall Sulphur, than the newly mention'd Crocus's have.

To this purpose I remember that by putting *Aqua fortis* in a certain proportion upon Crude *Antimony*, and after it was almost totally distilled off, increasing the fire till a dry substance began to sublime, we had in the upper part of the Retort a yellow and brittle substance, which being carefully separated from the dark coloured Antimoniall powder, that was also elevated by the force of the fire, appear'd not only by its own colour, but that of its flame, and some other signes, to be much of the nature of common *Sulphur*: nor is this the only way whereby we have obtained such a substance from Crude *Antimony*, from which (if I much misremember not) I have had a yellow and combustible *Sulphur* even without the help of a *Menstruum*.

Paracelsus pretends to have a way of drawing *Sulphurs* from all Metals; of which proceſs because I have found little

little, or no notice taken by Chymists, I shall for the oddness of it, and the reputation of the Author (whom I looke upon as a Man of great Experience in Metalline affaires) subjoyn it, as I find it among some of his loose papers or fragments.

Sulphur Metallorum
Theophrasti.

Sulphur Metallorum est oleitas ex ipsis extracta, pradita virtutibus pro hominis salute. Sulphur aliud ex Metallis antequam ignem sunt passa elicetur, ut ex Marchasitis aureis, aut argenteis, &c. secundum nobilitatem mineræ, etiam nobile & præstans: & paucis interjectis, (Extractio Sulphuris ex minetis Metallicis) Etiam fieri potest per lixivium acre & deputatissimum: sed (vel potius illa) alia sulphura pro intrinseco corporis usu minus sunt commoda propter alkali cinerum, ex quo clavellatum conficimus erodens, & propter calcem ex quibus talia sunt lixivia. Sulphur sic extractum po-

test ablui aqua dulci, & præcipitari. Digestio duplum requirit temporis. Debet & rectificari lixivium per ipsius sublimationem ab omni residentia terrestri, ne cum ipso incorporentur talia Sulphura, & fiant corrosiva ad perniciem agrotorum: quod ne fiat d. Et debet fieri separatio. Tantum de crudis.)

Sed jam fufis & depuratis elicias ipsorum Sulphur: certa nobilior meliorque via non dabitur, quam per aquam salis seu oleum ipsius præparatum, eo modo quem in Alchymia luculenter descripsi. Talis quippe aqua fundaliter & radicatus extrahit omnibus corporibus Metallicis liquorem ipsorum Naturalem, seu Sulphur & crocum præstantissimum tam pro operibus Medicis, quam pro Chymicis. Resolvit & frangit unumquodlibet Metallum, ex Natura ipsius Metallica deducens in aliam, pro varia intentione & industria laborantis.

Thus far Paracelsus's process; but as I know not whether it be true, because I am not able to reduce it to practise; so because I do not clearly understand his meaning, and what is

the true nature of the Instruments he would have us employ, I will not take upon me to determine, whether or no, the *Sulphurs* he teaches us to be obtainable by this method, be genuine ones, and fit to decide the question we are now considering.

But whatever become of this obscure *Paratelsian* process, what I was saying about a sort of body's less remote than the formerly describ'd *Crocus's* from the true *Sulphurs* of Metalls (if they have any such) may well subsist. For I remember we have sometimes (though the Experiment did not alwayes succeed) by cementing very thin plates of a certain Metall with burned allum, and afterwards dexterously elevating the more dispos'd parts with Sal-Armoniack, obtain'd a sublimate, from whence we separated, by ablution with faire water that dissolved the Salt, a substance, which by its inflammability appeared a kind of metalline Sulphur.

And this may suffice touching the first scruple I thought fit to propose concerning the factitious Sulphurs of metalls

metalls and Minerals. (To proceed therefore now to my *second* scruple,) it may I think be suspected, that even this sort of Body's which I have mentioned to have been drawn from a Metall and from *Antimony*, may not be the effects of a *bare separation* of preexistent *Sulphur*, from the other Ingredients of the Bodies that yeilded them, but new Concretes produc'd by the *operation* of the Fire on those Bodies, and by the *combination* of some of their parts with those of the *additament*, employed to obtaine the *Sulphurs*. For, as far as I have yet seen, either Salt-peter crude or distill'd, or Menstruums made of it, or of other Salts, or else Oleaginous liquors, are wont to be made use of on these occasions. And 'tis very possible, that some of the more dispos'd parts of these additaments may associate themselves with those of the Minerall or Metall to be wrought upon; and so from this Combination of the Ingredients, there may result a Body of a new Texture, which Texture may dispose it, to be combustible, or inflammable, whe-

ther the Ingredients in their separate condition were so or not. As I remember I have elsewhere shown, that though *Aqua Fortis* be not inflammable, nor a piece of Crude Copper inflammable or combustible in a common moderate fire, yet the Metall being dissolv'd in *Aqua fortis*, and the superfluous moisture warily exhal'd, there will remaine a fusible Concrete, wherein the Copper being much comminuted, and its small parts fitly associated with the saline ones of the *Mensstruum*, compose a kind of Vitriol that being held to the flame of a Candle, or even of a piece of Paper, will readily burne away in a flame finely colour'd; and which may, if one please, be kept in a flame distinct from the other.

To conclude what I have to say about my second scruple; it seems not improbable, that if any of the Metalls be by a fit *Mensstruum* or some other congruous additaments, reduc'd to parts minute enough, and that these parts be fitly associated with some of those of the *Mensstruum*; the Metall may thereby be brought

brought to burne or flame, as I have successfullly tryed by a way elsewhere declared, upon *Gold* it selfe, whose Sulphur the Chymists would have us looke upon, as (what seems not very agreeable to the Nature of Sulphur) incombustible, so that, for ought yet appeares, 'tis allowable to suspect, that the Sulphur *obtained* from this or that Metall, is not *so much* an Elementary or Hypostaticall Principle barely extracted, as 'tis a Magistery, or some other new compound, made by the Combination of the Metalline particles with all or some of the Body that workes on them. But if a Chymist *will have* Metalline preparations of this kind to be Sulphurs; I may be allowed to make them serve for Instances of the Producibleness of Sulphurs.

Yet these doubts concerning the Sulphurs of Metals I propose, but as *suspitions*, to draw on further, and more accurate Tryalls; by which perchance they may be happily removed. And speaking of the *Sulphureous Principle* of mixt body's, in that general notion of it, wherein

the Chymists often use it, and indeed must employ it; we may be thought to have said enough to our present purpose, though we had left *Mineral Sulphurs* untouch'd; since wee have shewn, that inflammable parts of mixt bodies may be *produc'd*, and therefore cannot be safely affirm'd to have *all* been *preexistent* in them.

The

The forth Part.

Of the Production of Mercury,

THe complaint I have divers times had occasion to make, of the darkness and ambiguity that Chymists have allowed themselves, if not affected, in treating of their *Three Principles*, is applicable to nothing more justly than to what they have written, about that which they call *Mercury*. For when they would seem to tell us what they mean by that Principle, they are wont to do it, in terms so loose and so ambiguous, that the representations they make of it, are more like to Panegyricks, and sometimes to Riddles, than to *clear definitions*, or so much as *good descriptions*. Since then they have given us no settled notion of what they call *Mercury*, but have left us to guess what they mean by it; I hope a mistake about it (if I should run into any)

would appeare pardonable. That which is agreed on by the most of Chymists, when they speake somewhat intelligibly of the Principle they call *Mercury*, is, that 'tis a crude substance, and that 'tis a volatile liquor, which by being so, may be distinguish'd from the *Saline* principles, especially from the *Alcalizate* or *fixt* salt, as it may also be from the oyle or *sulphur*, by it's not being inflammable. But these marks will not discriminate it, from *Phlegme*, which is also a fugitive and uninflammable liquor; and therefore to make the difference, they must add some other quality, such as *sapor*, (which yet agrees not to *Quicksilver* it self,) that is wanting to *Phlegme*. So that according to this doctrine, the nature of a Chymicall *Mercury* or *Spirit* will consist, in its being a liquor volatile, not inflammable like oyle or sulphur, nor yet insipid like phlegm: How odd a principle this must be, that comprises such differing body's, as an *Acid spirits*, as those of Nitre and Vitriol; *Urinous*, as those of blood Harshorne; &c. and *Anonymous* ones

as those of Guajacum, Honey, Raisons, and &c. forc'd from their acidity, and the running Mercury's of Minerals and Metals, as Cinnaber, Antimony, and Lead; under one Principle, which to deserve that name ought to have all the portions of matter belonging to it *Homogeneous*; I may safely leave any considering Naturalist to Judge. And therefore instead of taking further notice of this, it may suffice for my present purpose to mind you, that as for the *Mercury's* or uninflamable *spirits* of Vegetables and Animals, I have endeavoured to show their production where I discourse of that of *Spirits and volatile salts*. And therefore I need but say something of the Production of *Mercury* more properly so called, that is, *running Mercury*: about which perhaps it will not be less acceptable to you, and I am sure it will be less troublesome to me, if I leave you to gather my opinion out of three papers, that were written for differing *Vertuosi*, at severall times, and on distinct occasions; upon which account, besides those particulars

particulars that relate to our present Argument, you will perchance find some things, that you have not elsewhere mett with.

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*Whether Mercury may be obtained from
Metals and Minerals,*

Or

*(To speake Chymically) An dentur
Mercurii Corporum?*

THat there may be extracted or obtained from Metals and Minerals a fluid substance, in the forme of running *Mercury*, is the common opinion of Chymists; in who's books we may meet with many processes, to make these *Mercury's*: which because they are said to be afforded by Minerall, and especially Metalline bodies, these Writers affect to call (how aptly I now examine not) *Mercurios corporum*.

But notwithstanding all this, divers of the more learned of the Spagirists themselves, have look'd upon the pretension of other Chymists to the art of making these *Mercury's* as but a Chymical brag: and some judicious modern Writers, applauded therein by most of the mechanickall Philosophers,

phers, have proceeded so far, as to explode all these *Mercury's* of body's as meer *non entia Chymica*, nay some of them have not scrupl'd to censure all those who pretend to have seen or made any of them, as credulous or Impostors.

In the management of this controverſie, I confesse I am not satisfy'd, with either of the contending parties; and therefore though I shall not refuse to comply with your curiosity to receive in a few lines my thoughts, whither there are or may be any such *Mercury's* as are disputed of; yet I desire leave to premise such a state of the controverſie, as I think will avoid some verball janglings, and at least acquaint you clearely with the sense wherein I desire to have my opinion understood.

Waving then, in the present enquiry, the Question that may occur, *Whether or no the Mercury's said to be obtain'd from Metals and Minerals are primitive ingredients, or Hypostaticall Principles only extracted or separated from*

from the body's that afford'd them? I shall propose the question in these terms: *Whither or no from a Metall or Minerall body, there may, without the addition of any body, that we may be sure has any common Quick-silver in it, be obtained, by the help of Art, a substance resembling common Quicksilver, by being ponderous, fluid when actually cold; Amalgamable with Gold and some other metals, and indisposed to wet or stick to ones hand, or to body's not of a Metalline nature.*

To give you now my present thoughts, about this question; I shall offer them to your consideration, in the following propositions.

There are divers processes of making the mercury's of body's, that are so ^{The first} *proposuion:* *darkly deliver'd, that the generality of Chymists cannot sufficiently understand them, to be able to try them; for some of these processes are set down in termes of Art, which, for their great darknesse or ambiguity, are not to be understood but by the authors themselves, or those who are vers'd in the*
more

more mysterious parts of *Hermetick Philosophy*. And others there are of these processes, that require some *menstruum* salts, or other instruments, that 'tis not in the power of ordinary Chymists to procure. Instances of this kind may be frequently enough mett with, by those that have the curiosity to peruse heedfully the Writings of those that passe for the *Adept Philosophers*. And for a *specimen* of such processes, I am content to annex to the close of this paper, the way delivered by *Lullius* of making *Mercury* of Silver, *Helmont's* way of preparing *Mercury* of Lead, and *Paracelsus's* way of extracting the *Mercury's* of all Metals.

The second
Proposition.

There are divers processes to make Mercury's of body's, that are either false, or accompanied with circumstances that make them unfit to be trust'd. For there are of these process's that having been curiously try'd, by those that had a great desire to find them true, have not been found to succeed at all in practice. Hence we have so many complaints of Chymists, that have

have lost their labour in endeavouring to make according to *Bequintus's* directions (in his *Tyrocinium Chymicum*) the Mercury of Silver, though I do not take that to be one of the difficultest to be prepared; and he that converses much among those that have made attempts to make the *Mercury's* of other body's, as Gold, Antimony, &c. according to the vulgar processes extant in Chymicall books, will (if I mistake not) find by their confessions, how little the events of their endeavours answer their labours and expectations. Nor doe all the Manuscript processes that are communicated to private freinds, as great *Arcana*, much excell those I have been speaking of; as severall of my acquaintance have complained to me, that they have found to their coste. And here not to mention my own experience (which by the help of good Principles made me timely desist from unlikely attempts) amongst the many Chymists I have known, I remember not to have found above three or four credible persons, that would affirme to me, that they made or saw made the *Mercury* of any

ny metall or minerall (except of native *Cinnaber*, which is the natural oar of *Quicksilver*) in a constant way, by any procelle he had found in printed books, so that, so many of these processes having been upon triall found false, wary men may be excus'd, if they do not think fit to beleieve other processes of *mercurification*: which though not yet try'd seem'd not more probable, than those that have been already found so unsuccessful, that not only many learned modern Naturalists, but *Angelus Sala*, and divers others eminent Chymists themselves, have publish'd to the world, that these *Mercury's* are to be found no where, but in the bragging Chymists books and promises; and some have, as has been already intimated, gone so far as to brand all those, for cheats, that pretend they can make such *Mercury's*, and those for credulous that believe they can be made. But what I think of this severe opinion I shall quickly have occasion to declare.

The third
proposition.

There are some processes, wherein is thought that the Mercury of a metal

Minerall is obtained; when indeed the obtain'd substance is misnam'd, or the true Mercury that is said to be extracted, was put in, though in a disguised forme, by the operator.

I will not here give instances of the subtle cheats, that may be put upon the ignorant and unwary, and sometimes too upon the skilfull, if they be not also cautious; but shall content my selfe to illustrate the proposition, by a few known and therefore innocent instances; and first there are some, who finding themselves unable to make the true Mercury's of metals or minerals, make bold to ascribe the name of Mercury's, to productions who's qualities are very remote from those, that are agreed to be essentiall to Quicksilver. Thus *Globeus* speaks much of his Mercury of *Luna*, which yet is far from being running Mercury, or having the ponderosity and other properties of true Quicksilver. So *Angelus Sala* himselfe in his Anatomy of *Antimony* would have us to look upon the Reguline parts of that mineral, as its mercury: because

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he takes it for granted, it must contain *mercury*, and is pleased to fancy no other can be obtained from it. But the difference of the Reguline part of Antimony, and running mercury in point of consistence, gravity, and other quality's, will, I presume, indispose men to confound them. And therefore, I will proceed, to confirm the second part of our proposition; by shewing that the *Mercury* obtained by some processes that may succeed, made part of the Additament employ'd by the Artist in the operations, and so was not properly extracted from the metal, but only recovered from the body, compounded of the metal and the Additament. Of this, I remember, I have elsewhere given an easy instance in a deluding experiment, that I long since shewed some *Virtuosi*, in whose presence having mingled the filings of Copper with a certaine salt, and put them in a conveniently shaped vessel of Glass, I warily held it over a competent fire of well kindled charcoals, till the salt was thoroughly melted, and in part sublim'd

by which operation the Copper seem'd to be quite chang'd, especially in colour, and was really become inflammable, and there remained in the lower part of the Glass, a pretty deal of running Mercury, so that they would have gone away perswaded, that they did see me make the Mercury of Venus, if I had not been carefull to undeceive them, which I did by telling them, that this Quicksilver was only the common Mercury, that lay disguised in the compounded Sublimate I had imployed together with the Copper, which set the Mercury at liberty from the corrosive salts it lay concealed in before, by presenting them a Metall more disposed to be wrought on by them than Quicksilver is.

It is possible to obtain, att least from some metals and Minerals, true running Mercury, that cannot be justly thought to come meerly from the additament. This proposition a Chymist might more compendiously express by turning it into this short Assertion, *Dantur Mercurii corporum*; but I thought the words

The fourth proposition.

I have imployed would expresse my sense more warily and clearly; and yet *ex abundanti*, I shall add this further explication, that though the proposition speaks affirmatively, but of *some* Metals and Minerals; yet it does not deny, either that *more* Minerals or that *all* Metals may afford true running *Mercury*: by which I understand (according to what I formerly noted) a Minerall body fluid, opacous, exceeding ponderous, Amalgamable with Gold, and not apt to wet or stick to one's fingers, or any other body's besides some Metalline and Mineral ones.

That such a Mercury may be obtained without the help of Additions, whereof Quicksilver is an ingredient, I have been perswaded to believe by the following observations.

I remember that many years ago, having had an occasion to distill Copper with certaine saline substances, I was not a little surpris'd to find in the vessels (that had been luted together)

gether) some globules of running *Mercury*, which I could not reasonably suspect to come from the Ad-ditament, which was not Sublimate, nor any thinge I could Judge to containe Quicksilver. And though the indisposition I had to admit the *Mercury's* of body's, that so many learned men looked upon as non entities, made me somewhat diffident of the genuineness of the *Mercury* I had obtained, (whereof I had not quantity enough to make Just tryals) yet afterwards, when I found that accidents of the like nature had happen'd to severall of my freinds, I began to think, that what I had kept on-ly for a few dayes as a questionable rarity, might really have been *Venerial Mercury*.

A laborious Chymist of my acquaintance comming to visit me once when I was not well, was very earnest with me to communicate to him the way of making the *Mercury* of *Antimony* and of *Saturn*, and when I told him that I had no such processes of my own, and that I was far

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from

from believing those that I had met
with in printed books, to be true ones,
he would not acquiesce in this answer,
but declaring that he resolved to make
attempts to g. in such *Mercury's*, and
had rather do it, by Methods of my
proposing, than of his own devising,
he pressed me so much to let him
know which way I would go to work,
in case I had the same design, that
he then had, that to be rid of his
importunity, I told him what on a
sudden came into my thoughts: and
as sometimes the mind, being put to
such plunges, happens upon a lucky
hit, and such as much premeditation
would not have led it to: so it hap-
pen'd at that time to me, for when
I, because of my distemper, had for-
gott this affair, the Chymist, who was
a plain honest man, came to me with
great joy to give me thanks for the
instructions I had given him, bring-
ing along with him some *Mercury of An-
timony*, and a little *Mercury of Lead*,
that he had already made by the help
of those instructions; by pursuing
which, he expected to obtaine much
more *Mercury* from the Minerals when
they

they should be longer digested with the concourse of the air, in those Salts that I had advised him to grind with them. This pleasing success of directions, which I had as to divers particulars forgotten, made me desire them of the Chymist, who, beginning to be proud of his attainment, when he perceived I remembered not so much as he thought I did, ungratefully delay'd to bring me the account he promised me at first, till the plague reaching to the place where he lived, and dispatching him, deprived me of the hopes of satisfying my curiosity.

Two gentlemen of my acquaintance, but unacquainted with each other, working almost at the same time upon Silver, did each of them to his wonder, find parts of his Silver turned into running *Mercury*, with which odd accident each of them came to acquaint me, bringing along with them a little portion of the unexpected *Mercury*; one of these portions a servant of mine lost by mistake before I could try any thinge with it; the other I found by a tryall unknown

to the maker of it; not to be common, but metalline *Mercury*; of which the Chymist complained to me, that he had, sometimes had considerable quantity's to his great loss, because much of the Silver he employed in an operation; that he expected would prove *Luciferous*, being turned into Quicksilver had swallowed up all his gaine, and this was that which invited him to apply himselfe to me, hoping to be able to prevent or remedy this inconvenience by my advice, which I willingly gave him, but because of his departure out of *England*, could not know with what success.

A fellow-traveller of mine, having occasion to employ a saline body about *Lead*, after he had finish'd his operation, left the Lead and salt together for some months, in a vessel which he lay'd by in a Garret, where the air had access to it, afterwards wanting such a vessel, and not being able to supply himselfe readily in the country (in which his experiment was made) he remembered this long neglected

ed vessel, and coming to see whither it was fitt for his turn, he found to his wonder, that tho he had employ'd no Mercuriall body to work upon the *Lead*, yet part of it was already turned into *Quicksilver*, separable by straining, and more seem'd in a near disposition to admitt the like Change: Whereupon he brought me, as a rarity, a part of the Metall and a little of the Mercury, which I found by experience on Gold, to be of a Nobler kind than common *Mercury*. And I the less wondred at this Mercurification, because examining the Gentleman that chanced to make it, I found the maine thinge he had employed in the operation was common, or Sea-salt:

An expert Metallist of my acquaintance, being desirous to try, what Gold and Silver he could gett out of a fine *English Marchasite* I had presented him at his desire, he examined it according to his method, without any Mercurial preparation, and found to his surprise, that it yeelded him, besides other things, some running *Mercury*,

cury, which he brought and gave me, because it was afforded by the *Martha-*
site I had presented him.

The *Mercury* of *Antimony* more than one of my friends have made, by unsuspected additaments, such as salts, that have nothing to do with Sublimate, or other compositions where of common *Mercury* is an Ingredient. One of these *Antimonial Mercury's* look'd so oddly, that though it were made by distillation, I had that curiosity to try, whether it would not operate on Gold, in a peculiar manner, and having accordingly put a little fine *calx* of that metall (as about half a drachme or a drachme) into the palm of my hand, I added to it an equal or double weight of the above mention'd *Mercury*; That immediately incorporated with a very manifest heat. And this was the quick way I used to examine other *Mercury's* of body's, for though this alone be not a certaine signe of a *Mercury's* being of that sort, because I can obtain a *Mercury* so qualify'd by another way than any I have hithert

not mentioned; yet as their assertions and relations gave me sufficient ground to conclude, that they had obtained those *Mercury's* from the body's that they affirme to have yeelded them; so the readiness of these *Mercury's* to mix with Gold, without the help of fire, and even to grow hot with it, which vulgar *Mercury* will not do, confirmed, that they were Metalline *Mercury's*, rather than of the same kind with common Quick-silver. And my way of obtaining incalcescent *Mercury* is so quite differing from any of those, that there was not the least cause to suspect, that the *Mercury's* of body's we have been mentioning were so obtain'd, especially, since I knew that my way was unknown to most of the persons I have mentioned, and was practis'd by none of them.

As for the *Mercury* of Gold, though I think I have brought a great many parts of crude Gold to assume a Mercurial forme, and to come over in that forme by distillation (whatever sly learned men think of the insuperable

perable fixity of Gold) yet I confesse I have not seen any *Mercury*, that I was satisfy'd did deserve the Name of the *Mercury* of that metall. But happening to be once in a place Where a forreiner, that was a stranger to me, was showing a freind of his, with whom I had some little acquaintance, a Metalline experiment, that I confesse, I could not but admire (for this Forreiner was so civil, because I came so luckyly in, as to let me be present att the experiment though not to discover any thing of the drug he imployed about it:) I made bold to ask this civill Traveller whether he seem'd a candid Man and I perceived he had seen uncommon things; Whither he had mett with any way of making *Mercury* of *Gold*: to which he answered, that he knew no such way himselfe, but that he mett (some while before) with a very learned Man in comparison of whom, he confessed himselfe but a Novice, that put some *Gold* into a little vial, full of a certaine *menstruum*, which my relator owned he knew not how to prepare, and intimated to him, that the

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Menstruum would have a peculiar operation as well upon *Gold* as *Silver*. Afterward this Relatour having put the Vial well stop'd into his pocket, and carried it about with him, was, when he came home and took it out to set it aside, much surpris'd to find, instead of the *Gold* he had seen put in, a pretty quantity of running *Mercury*. Which the Artift, who only lent him the *Menstruum*, did not seem to think strange, when he was made acquainted with it.

If I would relate what I have heard from Men, that I judge to be either easily deceivable themselves, or concerned in point of interest to deceive others, or at least of a vain glorious bragging humour; I might easily swell this discourse to a greater bulk: But I have been carefull, to mention only those relations to which my selfe, in spite of my longe backwardnes to beleeve such things, saw cause to give assent. And if it be objected, these instances were but casual experiments, notwithstanding which there may be no settled way for the obtaining the
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Mercury's of body's: I might Answer that some passages of what has been lately delivered make it probable enough, That even settled wayes of making the *Mercury's* of body's, or at least of some of them, are not unknown to some Artists: though for certaine reasons, and particularly for the ingratitude of many Men, they do not think fitt to divulge them. But to answer more home to the objection: I shall need only to say that though most of the above recited experiments may be said to have been made by chance, in this respect, that those that made them, did not principally designe the obtaining of metalline or Minerall *Mercury's*; yet the effects produced, were as naturally and necessarily consequent, to operations so managed as they were as if the Artist had directly design'd them, as in some of the above mentioned relations they did. And it is not materiall for us to enquire whether the Quicksilver made by those experiments be to be ascribed to chance or skill, since whatever be comes of that question, it is plain,

that

that if metals and Minerals could by either way be brought actually to afford running *Mercury*; there needs no more to prove, that such *Mercury's* are really obtainable from them.

Doubts

Doubts about the preexistence of Running Mercury in Metalls.

THe propos'd Question, whether or no the Mercury's of Metalls and Mineralls be Principles preëxistent in them, and only extract'd from them, may to many seem, though it do not to you, a superfluous enquiry, since the generality of Chymists of differing ages and Countries, have resolutely determin'd it in the affirmative which is not at all to be wondred at, since according to their Hypothesis of the *Tria-prima*, (or three Hypostaticall principles) whereof they presume all perfectly mix'd bodies to be compos'd, Metalls, being of this sort, must consist of Mercury, as well as of Salt and Sulphur; and consequently must afford it upon the *Analysis* of the body into its three Primordial ingredients. But notwithstanding all this, the *Problem* seems to me difficult enough to be resolv'd, partly because supposing that there be true

true metalline *Mercury's* preparable by Chymists, they very studiously conceal the wayes of preparation; and partly because as 'tis very difficult to obtain any of the factitious *Mercury's*, wherewith to make such luciferous tryalls as a Naturalist would designe; so those few Authors that affirm themselves to have possess'd such *Mercury's*, have given us but an exceeding lame and defective account of them, not mentioning those particulars which are most proper and desirable, in order to the passing a right judgement about them. I pretend not therefore, to answer your question otherwise than conjecturally, till I shall be better furnish'd with matters of fact. But in the meanwhile that I may comply with your Curiosity, as much as I safely can; I shall confess to you, that for the present I am, by as much information as yet I have had, inclined to think, that the *Mercury's* obtained from Metalls do not clearly appear to have been preexistent in them, and only separated from them by the Artist, but that I think that at least some of them

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may be rather fluid Magisteries of Metalls than their extracted Principles. One of the most obvious things, that suggested this suspicion to me, was, that whilst some Metalls, as *Tin* and *Lead*, are in fusion, they would, to one that should not know of their being melted, appear to be many parcels of *Mercury*: since like it they are fluid and ponderous, and stick not to the Crucibles, or to Stones, Bricks, or almost any other bodies, except some metalline ones, divers of which they will easily pierce into, as *Quicksilver* does into *Silver* or *Gold*; so that if the fluidity of these metalls were permanent, they might pass for *Mercury's*. And if in the Moon and some of the other Stars, as there are Mountains, so there are metalline Mines in case the heat of the Climate or of the Soyle should keep them constantly in such a degree of heat, as we here find sufficient to melt *Lead* (which we know needs not be very intense) these metalls would there emulate the nature of *Mercury's*, as I have learned from Travellers, that in divers parts of the

Torrid

Torrid Zone, what would here be Butter, is fluid as well as unctuous like oyl, and is sold like other liquors, by measure not by weight: and an inquisitive Man, who is a Scholar as well as a Traveller, assured me, that whilst he was in some parts of the *Indies* he furnish'd himself with some liquid substances afforded by wounded Plants, that as soon as he came near *Europe*, and not before, turned into consistent and pulverable bodies; it did not therefore seem to me impossible, that the peircing salts, and other subtle body's employ'd by Artists, about the Mercurification (as some stile it) of mettalls, may either by the agility of their own nature, or by so altering the shapes, and loosing the wonted cohesion of the mettalline corpuscles, bring them to have such a Texture and such pores, as may enable the Ethereall substance, whereto so many other bodies owe their fluidity, to agitate them. These causes I say, or some other that may be propos'd, may possibly keep the prepared metall fluid; as we see, That though *Cam-*

phire be a consistent and tough body, yet some Nitrous spirits of *Aqua fortis* will easily penetrate it, and may be brought to stay so long with it, that I have for curiosity sake kept the oyle of *Camphire* severall years without loss of its fluidity, which I found that this kind of liquor would retain, though for tryalls sake I expos'd it to intense degrees of Cold, such as would freeze divers other liquors. Nor did it to me seem impossible, that a small quantity of appropriated Additament might suffice to put a metall into a state of fluidity; for since we see that the vapour of *Lead* can arrest *Quicksilver*, and make it a consistent body; and since *Helmont* assures us, that the liquor *Alkabeft* being once abstracted

Est scilicet (Corallatus Paracelsi) Mercurius a quo liquor Alkabeft semel distillatus est, residetque in fundo coagulatur & pulverabilis, nequicquam in pondere auctus aut diminutus. Helmontius in Scriptis de Arcanis Paracelsi.

from running *Mercury* deprives it, and that almost irrecoverably of its fluidity, so as to make it pulverable; it appears not, why Nature or Art may not be able to supply some corpuscles, that may expell or disable those that keep a metall in the

the forme of a fluid body ; and especially since, as I have elsewhere shewn, the matter of mettalls themselves may (at least sometimes) have been a liquor, or some other fluid body.

Another Reason that induc'd me to suspect, that the *Mercury's* of mettalls and Mineralls are not, as 'tis presum'd, meerly extracted Principles or Ingredients, was, that I have observed a greater dissimilitude between *Mercury's* all of them quick, and furnish'd with all that is requisite to make them pass for true *Mercurys*, than will comport with the supposition, that they are simple and Primordially Body's, barely extricated from the others with which they were at first commixt. But this Argument being the subject of an intire, though short, Discourse, (of the Dissimilitude of *running Mercury*) I need not inlarge on it in this Place.

It did also strengthen my suspicion to consider, that the Chymists that

talke of the *Mercury's* they have drawn from mettalls, are not wont to tell us what other Ingredients they obtain'd by their suppos'd *Analysis's*, which left me dubious, whether they obtain'd any salt and sulphur, or not; and of what nature those substances were that they did obtain. For if these were not true salt and sulphur, the genuinenesse of the *Analysis* might be question'd; because it may be alledg'd, that the Chymical Operation and the Additament turning some parts of the metal into Decomposed Bodies, which must be acknowledg'd not to have been (in such) formes preexistent in them, may also have by change of Texture turn'd some other parts of the metall into the forme of Mercury.

To the foregoing Considerations afforded me chiefly by the nature of the thing, I shall for the sake of those that are mov'd by the authority of *Adept Philosophers*, as they call them, add that, which among them ought to pass for a Prooffe, from Experience.

For

For *Raymund Lully*, whom I take to be one of the greatest Chymicall Philosophers whose Writings are come to our hands, though in many of his other Bookes he speakes of *Mercury* in a darke and Allegoricall sense; yet in that excellent little Tract which he calls his *Clavicula*, Vide Lullium in Clavicula. cap. 2. he delivers a Process, (which is not to be wrought with vulgar *Mensstrums*, though they beare the same names with those he prescribes and names) From the close whereof it seemes manifest, that his Designing was not to extract a preexistent *Quicksilver* out of the mettall propos'd, but to turne the mettall into *Quicksilver*; since he orders and directs us to prosecute the *Mercurification*, till the obtained *Quicksilver* be equall in weight to the *Silver* that was to be transmuted. And partly upon this I have ventured to ground the foregoing *Paradox*; That the *Mercuries* of Bodies are rather *Magisteries* than *Extracts*. For in this *Lullian* Process, it appears not, that the Mercuriall Principle was extracted from the Salt and Sulphur, but rather that the Body of the

metall (without being Analyzed) was turn'd into Mercury: and though *Magistery* be a terme variously enough employ'd by Chymists, and particularly used by *Paracelsus* to signify very different things ; yet the best notion I know of it, and that which I find authoriz'd even by *Paracelsus* in some Passages, where he expresses himselfe more distinctly, is, that it is a Preparation, whereby there is not an *Analysis* made of the Body assign'd, nor an extraction of this or that Principle, but the whole, or very near the whole Body, by the help of some additament greater or less, is turn'd into a Body of another kind. As when Iron or Copper by an acid *Menstruum*, that corrodes and associates it selfe with it, is turn'd into Vitriol of *Mars* or of *Venus*; and *Quicksilver* having a sufficient quantity of *Aqua fortis* strongly abstracted from it, is changed into a red Precipitate ; or by being sublim'd up with common Sulphur, is turn'd into *Cinnabar* ; or, to give yet a more apposite example, when *Quicksilver* (which is the Body we

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treat of) is by the lasting operation of the fire, without external Additaments; at least distinct from the Igneous Particles, turn'd into a red Powder, that Chymists call *Precipitate per se*.

I have received credible information and some proof too, that there is a place in *Transylvania*, where portions of *Running Mercury*, which when they fall out of the Earth and lye a while in the Air, do of themselves coagulate into permanently hard bodies: so little a distance hath Nature her selfe there put between the Mercuriall fluidity, and the solid consistence of the same portion of matter. So that if so small a thing (and perhaps unponderable as well as invisible) as the Contract of the Air can expell, is able by its presence to retain a minerall body in the form of a true *running Mercury*, as well as by its recess to leave a solid body, I see not why it should be impossible for Art to interclose some very minute and restless particles; which by their various
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and incessant motions, may keepe a Mettalline body in the state of fluidity; much after some such way, as I lately noted, that the spirits of *Nitre* did for whole years together keepe *Camphire* in the forme of a liquid oyle.

Having now propos'd some of the considerations, that inclin'd me to think, that the *Mercuries* obtained from Mettalls and Mineralls, may not have been preexistent in them; the impartiality that I think becomes a Naturalist, obliges me, to take notice also of those things, that occur'd to me, in favour of the received opinion of the Chymists, in behalfe of which, I objected to my selfe divers specious Arguments.

Of these, the first was, the generall Consent of Chymists, who take it for granted that all Mettalls are composed of *Mercury* as a materiall Principle, and commonly more copious than any other constituent part of those bodies; but this being an Argument, drawn only from authority, was of small weight with me, in a Controversy,

pro:

properly determinable by reason and experience.

2. A second objection was afforded me, by many processes I had mett with in Chymists Books, to extract the *Mercuries*, as well as the *Sulphurs* and *Salts* of mettalls. But neither did this Argument appear to me of any great moment, for most of these processes I look'd upon as fictitious things: which if the Authors of them, had taken the paines to try themselves, they would have found not to succeed in practice, and scarce any of them was so skilfully fram'd, as to satisfy a considering Naturalist, in case it had succeeded; that the obtain'd *Mercury*, was a pure Principle only separated or extracted, from the other Ingredients of the mettalls, and not a result of some mettalline parts conjoyn'd with some parts of the additament, as it seem'd manifest enough to me; that the supposed salts of mettalls that are pretended to be made, by such preparations, are not the Principles of such mettalls, but new concretions, and indeed not simple, but decomposed

ded bodies ; as is evident in the salt or sugar of *Lead* made with the spirit of Vinegar ; and in the salt of *Steel* made with that, or other acids.

3. A third objection, and of greater weight, seem'd derivable from this consideration, that *Quicksilver* easily *Amalgams*, with mettalls, because of its cognation with the Mercuriall part these bodies abound with.

4. And this Argument appear'd capable of being strengthen'd by a more considerable one: which is, That the gravity of the mettalls is such, as cannot reasonably be deduc'd from any other cause, than an abundance of the Mercuriall Principle, their being no other bodies (known to us) besides *Quicksilver*, that are near so ponderous as mettalls.

These two objections, I thought fit, to couch together, to be able in fewer words, to answer them both; I considered then that *Amalgamation* being in effect, but a kind of dissolution of mettalls, in a *Menstruum* or fluid body;

for

for such *Mercury* is in reference to them; there is no necessity, that the Solvent, should find in the Metall, a copious ingredient just of its own nature: for dissolution depends not, so much upon the pretended cognation between the Solvent and the body it is to work on; as upon the congruity, as to size and figure, between the pores of the latter and the corpuscles of the former. As may appear by the Solution of *Ivory* and *Harts-horn* (which belong to the Animal kingdome) that may be made with *Aqua fortis*; and by that, which I have elsewhere shewn may be made of *Zink*, and even of *Copper*, by the spirit of Vinegar, the Urinous spirit of *Sal-Armoniack*, and spirit of *Vitriol* separatly imployed; though the first of them be a *Menstruum* drawn from a Vegetable, the second from an Animal, the third from a Mineral substance. And as for *Amalgamations* themselves, I observe, that the facility *Mercury* finds in joyning with a metall, does not barely depend upon the Plenty of the Mercuriall ingredient, contain'd in the mettall, at least

least if the greater ponderosity, or specifick gravity of the metall depend upon the copiousness of the same Mercurial Principle, or ingredient, as the fourth objection supposeth: for we finde by experience, that *Mercury* will far more easily *Amalgame* with *Tin* than with *Copper*, which yet is much more heavier than it; nay than with *Silver*, which is a good deal heavier, (in Specie) than *Copper*; And is by Chymists presum'd to be much nearer of kin to *Mercury* than is *Tin*. To which I shall add, that although *Mars* be specifically heavier than *Tin*, yet it is far from being more easily Amalgamable with *Mercury*, that though *Tin* will readily admitt this Minerall liquor, without the help of heat, there is no way vulgarly known to Chymists to make an immediate Amalgame between *Mercury* and *Mars*. So that one of the two objections I lately joyned together, must be declin'd: since by the tryals I have purposely made, it appears, that either the disposition of Metals to Amalgamate with *Mercury*, do's not barely depend upon the

the suppos'd plenty of *Mercury* contain'd in the metall; or else that the greatness of the specifick gravity do's not depend upon the more plentiful participation of that Mercurial ingredient. Although the fourth objection be built upon a supposition, that the great ponderousness of Metals, in comparison of other bodies, can proceed from no other cause than the great quantity of *Mercury* they contain; I considered too, that it might be justly demanded, whence, *Mercury* it selfe, as well as whence Metals, derive their greater ponderosity, and I see not, why it may not be said, that both the one and the other own it to the Solidity and close order, of the corpuscles, they consist of, to which qualification it is not essential, that the portion of matter endued with them, be in a state of fluidity, rather than in one of consistence: as on the contrary we see that *Gold* and *Lead* are exceeding ponderous bodies, as well, when they are in fusion, as when they are cold and hard; and so in *Quicksilver* as well in its wonted and liquid

liquid forme, as when it is coagulated, as Chymists suppose, by the vapour of *Lead*.

But this will be somewhat further cleared in what I shall say to the fifth and last objection, that my thoughts suggested to me, and which Philosophicall candor forbids me to conceal: though I find it easier to be proved than answer'd. It may be then alledged in the fifth place; That the *Mercuries* of mettalls must needs be but partial Principles of them, since *Quicksilver* being confessedly heavier, than either the Sulphureous or saline principle, and being specifically heavier than almost any mettall it selfe; the gravity of a mettall cannot reasonably be supposed to proceed from the whole body of the mettall, but only from some one ingredient heavier *in specie* than the rest, and, than the mettall it selfe. And this ingredient or principle can be no other, than the most ponderous body, *Mercury*.

This difficultie I confess, does keep
me

me yet in some suspense, till I have further opportunity, to make such tryalls, as I think proper to clear it. Yet in the mean time, I shall offer some few things, which perhaps may lessen it, if not quite remove it.

I consider then that there is no necessity to suppose, that Metals, of what denomination soever, as *Tin*, *Iron*, *Silver*, or *Gold*, are body's perfectly *Homogeneous*, though they seem such to our eyes. This supposition I elsewhere purposely discours of, but in this place I need not spend time about it; since the Chymists (who are those I now reason with) do not only allow, but teach it, since they will have Metals as well as other mixt body's to consist of three Hypostatical principles, whereof *Mercury* is one, although it must be much heavier in *Specie*, than either the *Salt* or the *Sulphur* it is blended with: because it is from the participation of that ingredient that they derive the great ponderousness which Metals have in comparison of other bodies.

And to this granted supposition, I see not why it should be absurd, to add this other, That the more solid and heaue parricles or corpuscles of a Metal, may lye in it, not in the forme of fluid or Mercurial, but consistent parts, and that these may be more disposed than the rest, to be brought by Chymicall additaments and the operation of the fire, into the forme of a running Mercury. Nor ought it to be judged incredible that the forementioned solid portion of the Metal, should be more ponderous than Quicksilver, since as I have often tryed, Gold, though a consistent body, is far heavier than Quicksilver, to the bare participation whereof Gold cannot owe its specifick gravity.

If this Hypothesis be admitted, it will be easie to give an account how the Mercury of a Metal may be heavier in Specie (that is, bulk for bulk) than the Metal that afforded it; for the difficultie is easily resolved, by saying, that the solid parts, which by the Chymical operation, are reduced

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into the forge of *Quicksilver*; were far more ponderous in kind than the other parts of the Metal; which being also associated with them did by their comparative lightness make the entire Metal less heavy (if the bulks be equall'd) than an aggregate or convention of all the solid parts alone would have been. Which may be illustrated, by what I have heedfully observed, of the decrement of specifick gravity, sustained by *Quicksilver*, when it is united by Sublimation either with Sulphur into Cinnabar, or with Salts in Corrosive Sublimate.

But I must not dissemble, that against the foregoing discourse there occur'd to me a couple of Arguments (that I have not met with amongst Chymists) whereof the latter is very considerable. For I foresaw it might be alledged, first, that the *Mercuries* of Metals being in a liquid form, could not well be supposed, to be so close and ponderous bodies, as our *Hypothesis* requires: and next, That we our selves admitt an experiment of *Raymund Lully*, whereby

he pretends to reduce the whole body of *Silver* into *Mercury*, which is a heavier substance than *Silver*; and in this case we cannot have recourse to this answer, That the corpuscles, which assume the forme of *Mercury*, were far more ponderous, than the others, that concurred with them to compose the metall.

This twofold objection, I do not pretend to answer at once, but may perhaps enervate it by degrees.

And first, though it be very possible, that a pretty quantity of additament may be employ'd about the *Mercurification* (to speak in the Chymists language) of a metall, yet there shall really and finally adhere to the metalline parts, but a very small proportion of Additament, that will continue with them, and keep them in a Mercuriall flux. And it may appear the more credible, that a very small quantity of additionall matter, may have a very great stroke in altering the consistence of that which is obtain'd from a metall, as its most ponderous portion;

portion: if you consider with me, that the bare accession of Igneous particles, is able in time, to turn *running Mercury*. Nor must I pretermitt on this occasion, a notable passage I remember to have met with in *Helmont*, who relates, that by the abstraction of the liquor *Alkabeft* (which is wont to come all over in distillation from common *Quicksilver*) he did quite deprive it of its fluidity, and turn'd it into a consistent body, and even into a fix'd one; whereby you may see how little a quantity of matter will serve to change the consistence of a body of a Mercuriall Nature.

Besides that, a fluid forme do's not alwaies argue the lightness of the body, that it is found in, since it may consist of particles, so solid and so numerous, that notwithstanding their intestine motion, the body they compose may be very ponderous: as may appeare by red hot Iron, melted Lead, and which is an Instance apposite to our purpose, in common *Quicksilver*, which though fluid is heavier than

any known body in the world; Gold excepted.

But I consider farther, that though the solid portion of a metall retain more of the additaments employ'd to bring it into the forme of *Mercury*, than it can be prov'd to contain, yet this disadvantage may be compensated by the new disposition of parts, that the Mercurifi'd portion acquir's, by the operation that turn's it into a liquor, and may be suppos'd to bring the parts to a closer or otherwise a more expedient order than they were in before: as Ice when thaw'd takes up less roome, in the forme of water, than it did before it became a liquor. I see no impossibility, that the specifick gravity of metalline bodies may be increased or diminish'd by such small proportions of additaments, as do not at all considerably add to their absolute gravity. This the Chymists ought not to deny, if they consider what themselves grant, of the efficacy of what they call the *Philosophers Stone*, whereof they tell us that one grain, if it be of a nobler or

der or degree, may transmute a whole pound of *Quicksilver* into perfect Gold; and consequently the specific gravity of a metall is notably changed by an additament, which (according to the differing pounds used in severall Countreys) amounts not perhaps to the 6. or 7. thousand part of its weight. Besides, the transmuting powder being a Compounded body, whereof but part is *Gold*, may probably be suppos'd to be more light *in specie* than the metall that by addition of it is produc'd; which being pure *Gold* is the ponderourest body yet known to us. And to confirme the Argument, I shall add, that there is a way, though I pretend not to know it, of making a metall far lighter *in specie*, than it naturally is, by the addition of less than a 100. part of its weight, as experience has convinc'd me.

Wherefore to come now to the grand objection furnish'd by *Lully's* I tely mention'd experiment, it will not presently follow, that if the whole body of a metall be brought into a mercuri-

all forme, this *Mercury* will swallow up and destroy our *Hypothesis*: for though I grant that in this case, it cannot be said, as in the former cases (wherein a part only of the metall is Mercurified) it may be, that the obtain'd *Quicksilver* consists of the more solid and ponderous parts of the metall; yet it may be still said, that, *for ought we know*, the *Mercury* produc'd, by the reduction of the whole metall into a fluid forme, may be specifically lighter than common *Mercury*, and so cannot be necessarily concluded to be specifically heavier than the metall that afforded it. I lately imployed the words, *for ought we know*, because we are now upon the case, wherein Philosophicall candor invited me to acknowledge, that I wanted further tryalls to give my selfe full satisfaction: for although I have had portions of the *Mercury's* of more than one or two metalls, yet it was but in small quantities; so that the other tryalls, I had the curiosity to make with them, kept me from examining their specifick gravity, and from finding by an Hydrostaticall way that I have elsewhere
 decla-

declared, whether they were not lighter *in specie* than inferiour metalls, and consequently than common *Mercury*. For that *Quicksilver* may be specifically lighter than the metall that affords it, I think the Chymists cannot reasonably refuse to grant, since they allow that *running Mercury* may be obtain'd from *Gold*, and tell us great matters of it, because of its proceeding from so noble a body. Now if this *Golden Mercury* be said, (because of the suppos'd resemblance of all *Mercury's*) to be of the same specifick weight with common *Quicksilver*, then I have a notable instance, of a *Mercury* that is considerably lighter *in specie*, than the metall that afforded it. And therefore, till experience have manifested the contrary, it will not be absurd to presume, that the *Mercury's* of other metalls, may likewise be lighter *in specie*, than the respective body's from which they were obtained: but if it be said, that this *Golden Mercury*, may perhaps be as ponderous as *Gold* it selfe, or even more, then 'tis plaine, that it is possible for a Metalline body,

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notwithstanding its being reduc'd into the forme of a fluid, to be equi-ponderant to the Metal that afforded it. And that I may not seem to argue, altogether, from the concessions the Chymists ought to make; I will add, by way of Confirmation, a couple of things that perhaps you will think somewhat strange. Whereof the former is, That it is possible for a Metalline body to resemble another in all the manifest qualities, whereby Artists are wont to examine them, and yet they differ much from it in specifick gravity: as I had once opportunity to observe in a Metal that was not only white (within and without) like *Silver*, and very malleable, but did, when I purposely examin'd it, endure Cuppellation, and pass'd for & was reputed by a very eminent Artist that sent it me to examine, to be good *Silver* in all proofs; and yet this Metal found by Hydrostaticall tryalls to be much lighter *in specie*, than common *Silver*. And if the famous person that sent it me, was not mistaken (for so I must not think he would knowingly misinforme me,) This odd metall may yeeld

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me a notable instance to my present purpose, since he affirmed this metall to be made without the addition of any metalline body of *Quicksilver*, which, if this be so, must, by a change of Texture, have made a considerable loss of its specifick gravity. But to proceed to my second instance, which will be yet more apposite; I shall add, that once I had a *Mercury* which amongst other remarkable properties, that belong not to this Argument, had a very strange one; namely, that it was considerably heavier *in specie* than *common Mercury* (as I found & shewed to a great *Virtuoso* by Hydrostaticall tryall,) though it was made of a body no heavier than *common Mercury*, and by the help of additaments which were much lighter than *common Mercury*. And this was so far from being a more gross and sluggish kind of *Quicksilver* than the ordinary, that it look'd very fine, and was very agile, and had before I examined it been more than once distilled. By this it may appear, that from hence, *that a body is in a mercuriall form*, we cannot safely determine what degree of specifick gravity

vity it has. For since by this last example it appears, that a sort of *Quicksilver* may be far more ponderous than common *Quicksilver*; it seems not unreasonable, that a sort of *Quicksilver* may be far lighter than common *Mercury*, and so perhaps lighter than the metalls that were reduc'd into that forme: it being far less likely, that the former should be produc'd than the latter, in regard there is but one minerall body in the world, that we know of, at all heavier than common *Quicksilver*; whereas there are many of those that are capable of being associated with it, that are far lighter than it.

But as I intimated above, I am unwilling to speak so positively about this matter as I might do, if I had opportunity to make the tryalls I would with the *Mercuries* of body's: only thus much I shall venture to say, that for ought yet appears, the Argument I have been answering all this while, is not cogent, since it is built upon a supposition, that the *Mercuries* afforded by metals and minerals, must

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be of the same weight with common *Mercury*; which is not only a proofless assertion, but repugnant to the Experiment lately mention'd of the distilled *Mercury*, that was heavier than common *Mercury*, and to the presumption deriv'd thence, that there may be body's, in a Mercurial forme, more light *in specie* than common *Mercury*. And whatever becomes of the opinion I incline to; The Argument I have been examining, of the Chymists, may be invalidated by what I have said, where I took notice of the notable excess of ponderosity, that pure *Gold* has in regard of common *Quicksilver*: for by that instance it plainly appears, that it is not to the participation of common *Mercury*, that metals must necessarily owe their great ponderosity; but that nature, (and Art too,) may contrive the parts of a body into so close an order, as to make that body (whether solid or fluid,) more ponderous, *bulke for bulke*, than common *Quicksilver* it selfe.

Having now dispatched what I intended

tended to say in the foregoing discourse, it remains that I performe the promise I made, of adding the waies of *Mercurification* (as Chymists speake) above refer'd too, as deliver'd by *Paracelsus*, *Helmont* and *Lully*: about which I must give you this advertisement, that besides the obscurities, and imperfections, that a moderate degree of attention may enable you to discover in these processes, understood in the literall sense, there are, if I much mistake not, some affected Equivocations in terms, that seem very plain, and free from suspicion of ambiguity. As for instance, though the word *Sal. Armoniacum* seem to be of this sort, yet amongst *Hermetick* Philosophers it often signifies not common *Sal. Armoniac*, which is far from being able to perform the effects they ascribe to theirs, but a very differing and much more noble and operative thing, which because it may be sublim'd like common *Sal. Armoniac*, they are pleas'd to call by that name: and though sometimes they give it the title of *Sal. Armoniacum Philosophorum*, yet oftentimes they

they omitt the discriminating Epithite, especially in Philosophical processes, (that is, such as those wherein they deliver their higher *Arcana*,) of which sort are many of *Paracelsus's* processes, and more (not to say most,) of *Lully's*. What is meant by *Sal-Armoniacum Philosophorum*, I think it needless to tell you here, (but may perchance do it on another occasion,) since that composition requires an Ingredient that neither of us is furnish'd with, and that you cannot procure. There may be other Ambiguities in the following processes, that will not be easily discover'd, but by such as are vers'd in the mysterious language, which some would call *canting*, of the *Hermetick* Philosophers. But I think I have said enough already to shew, that the annexed processes are fit to confirm what is delivered upon the first Proposition of the foregoing discourse; and therefore without offering to explain them, I shall subjoyn them in the proper terms of the respective Authors.

Ratio

**Ratio extrahendi ex omnibus
Metallis Mercurium
Paracelsica.**

Hæc extractio (Scilicet Mercurii ex
Metallis) fit per aquam Mercurialem,
quæ nec Joanni de Rupeſciſſa, nec
aliis, quicquid etiam jaſtitent, cog-
nita fuit. Ideoque diligenter
eſt cognoscenda, & indefeſſo
labore tractanda. Hoc ergo
paſſo paretur diſta aqua
Mercurialis.

*R. lb. III. Mercurii ſublimati ſepties per
Vitriolum, Sal Nitri, & Alumen.*

S Aliis Armoniaci, ter à ſale ſublimati
& clari & albi ſſi. Trita ſimul &
alcolizata ſublima in ſublimatorio per
are nam, horis 9. Ubi refrixerit, ſub-
limatum cum penna detrahit, & cum
reliquo ſublima, ut prius. Hanc opera-
tionem quater repete, donec amplius

non sublimetur, & in fundo massa nigra
 maneat instar cerae, fluens. Refrigerata
 exime, & tritam rursus in patina
 vitrea saepius cum salis Armoniaci a-
 qua s. autem preparata, imbibe, & sua
 sponte coagulata rursus imbibe & sic-
 ca, ad 9. seu 10. usque vices, donec
 ferè non ulterius coaguletur. Tritum
 subtiliter supra Marmor in loco humi-
 do solve in oleum pulchrum, quod re-
 disticabis per distillationem in cineribus,
 ab omnibus facibus & residentia.
 Hanc aquam omnium facile principem
 diligenter asservabis, cuius R. unc. VIII. &
 impone laminas opt: solis aut Lunæ;
 optimè mundatas, pondere unc. iss. vitro
 clauso repone ad digestionem in cineres
 calidos horis 8. Corpus tuum videbis in
 fundo vasis transmutatum in subtilem
 vaporem seu Mercurium. Factâ solutio-
 ne totius aquae Mercurialis per Alembi-
 cum lento igne à prima materia subli-
 mando separa, & in vitreo vasculo
 diligenter asservato. Habebis hoc pacto
 verissimum Mercurium corporis. Para-
 celsus in Man: de lapide Philosopho-
 rum.

Sens (saies he) cruditatem Saturni,
 pinguedine fixorum salium solubilem,
 O solo

solo quandoque igne carptim debilem,
 sicque dividi compositi partes, crudum-
 que Argentum vivum currere permitti.
 Sulphur fugitivum superans in saturno
 trahere ad volatum, fixum, inseparabi-
 liter junctum. Quodque expediet impri-
 mis Saturni sublimatio. Cujus expres-
 sione nulla est elevati ad residens, coloris
 aut substantiæ differentia. Unde eti-
 am caloris, fusionis & mollietiei causis,
 post calcinationes & reductiones, residu-
 is medullitus, sine igne fusionem, soli-
 tamque mollietiem minimè refutat. Hel-
 montius, in potes. medicaminum. num.

40.

 Ex.

Extractio Mercurii à Corpore
Perfecto.

R Ec. unc. 1. calcis Luna appellata, calcinetur modo quo dicitur in fine nostri magisterii operis, qua quidem calx teratur super porfidum in pulverem subtilem, quem pulverem imbiberis bis, ter, quater in die, cum optimo oleo Tartari, facto eo modo quo dicetur in fine nostri, desiccando ad solem quousque dicta calx absorbuerit de dicto oleo 4. aut 5. partes, plus quam fuit ipsa calx, terendo semper super porfidum, ut dictum est, & in fine bene desiccetur calx, ut bene possit in pulverem redigi. Et quando fuerit bene pulverizata, ponatur in metreto cum collo longo. Ponatis de nostro menstruali fetenti, facto de duabus partibus vitrioli rubei, & una salis petra, & praedictum menstruum prius destilletur septies, & bene rectificetur, separando faeces terrestres in tantum, quod praedictum menstruale sit totum essentiale. Deinde lutetur bene metretum, & ponatur ad ignem cinerum, cum parvo igne carbonum, quousque videris materiam bullire & dissolvi. Deinde sic su-

pra cineres distilla, donec amiserit Menstruum, & materia fuerit frigida totaliter, cum frigidum fuerit, vas aperiat, & materia, quae frigida est, ponatur in alio vase bene mundo, cum sua cappa bene lutata ad furnum supra cineres, & luto bene desiccato, fiat ignis paulatim in principio, quousque totam recipias aquam ipsius. Postea augetur ignis, quousque materia bene fuerit desiccata, & spiritus fatentes sint ad cappam, & in receptorio jam exaltati. Et dum tale signum videbis apparere, dimittatur vas infrigidari, ignem minuendo. Et post refrigerationem vasis, extrahatur materia, & in pulverem subtilissimum redigatur super porfidum; ita quod pulvis sit impalpabilis, qui ponatur in vase terreo bene cocto & bene vitreato. Et post ponatur super dictum pulverem de aqua communi bulliente, movendo semper cum baculo mundo materiam, usque materia fuerit spissa sicut sinapi. Et move dictam salisam cum baculo, quousque videris apparere grana Mercurii e corpore, & quod vobis appareat quantitas magna praedicti Mercurii vivi, secundum quod posueris de corpore perfecto, id est, de Luna, &

dum

*dum habueris magnam quantitatem, interim projice desuper aquam bullientem, & tandem movendo, quoad tota materia resolvatur in materiam similem argento vivo vulgari, tollantur terre-
streitates cum aqua frigida, & desiccetur per pannum: postea transeat per corium,
& videbis mirabilia. Lullius in Clav-
vicula. Cap. 2.*

FINIS.

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Of the Dissimilitude
Of
Running Mercury.

BEfore I undertake to give you my opinion, about your question, I must crave leave to state it somewhat more clearly, by propounding it thus: *Whether all the Bodies, that in the shops, and among Chymists pass for true running Mercury's, are Homogeneous?* Or, so much of one and the same nature, that the severall portions of such *Mercury's* are but numerically different? Now to the question thus stated, the fear of seeming to maintaine a Paradox, by dissenting from the generality of Chymists, as well as Naturalists, (who are wont to employ indiscriminately all *Running Mercury's* not manifestly adulterated) will not keep me from returning a negative answer.

And though it were not over difficult

cult for me to give you the reasons of my opinion, drawn up into method, and referr severall instances I shall produce, some to the depuration of *Quicksilver*, some to the impregnation of it, some to the Coction, and others to two, or all these waies of altering it; yet I shall rather present you with them, by way of loose observations, because I presume that freedome will not be unacceptable to you, as it will allow me, to give you some few, but uncommon notices and hints about such noble subjects as prepar'd *Mercury's*.

1. In the *first* place then it may be observ'd, that a *Running Mercury* may be brought to differ from *common Quicksilver* by *Depuration*; for there are in most *Mercuries* either Recrementitious particles, or at least some loose adherencies, that are separable from the rest of the Body, and which being seperated, the *Mercury* becomes more Homogeneous or cleane than it was before this externall Depuration, (for so I call it to distinguish it from another

another that is internall) that is usually made by grinding and washing *Mercury* very well with salt and Vinegar, (for which purpose I also sometimes use spirit of Wine) which one may not unfrequently see somewhat foul'd by what it carries off from the *Mercury*, which is also sometimes attempted to be purified by the more laborious way of distillation, which, though in some cases insufficient, (as I shall shew anon) is in some others very convenient; whereto some Artists add other probable meanes, tending to the same purpose. So that I do not wonder to find, that divers Philosophicall Spagirists themselves, before they proceed to more intimate preparations of *Mercury*, order it to be severall times previously incorporated and sublim'd with Acid *Salts* or *Sulphurs*, and then reviv'd with *Alcalies*: since without examining *their* grounds it may be said, according to Mechanicall Principles, that by diligent commixtures the *Mercury* is divided into exceedingly minute, if not invisible, Globules, or such like parts, and by this great comminution,
it

it acquires far more of surface than it had before, by which meanes a great multitude of separable parts come to be touch'd almost of every side by the Salts or Sulphurs, to which by this meanes, when the *Quicksilver* is driven from them in the revivification, 'tis probable, that very many of them sticke that were not superficial, when all these Globules made up but one Mercuriall Mass. And tis possible too, that the *Alkali's* employ'd to revive the *Quicksilver*, may help to tear of from it some of the feculent particles which the Chymists would desire to have it freed from. And here let me advertise you upon the by, that there is no necessity to have recourse to salt of *Tartar* or *Quicklime*, or such like *Alkali's* for the reviving of *Quicksilver*, and therefore when I would with ease obtaine a cleane and active *Mercury* for some purposes, I do not employ Acid and then Alcalizate salts, but mix very well common *Cinnabar* finely powdered with a double weight, or at least, an equall weight of filings of Iron, or Steel: for these being distill'd together

ther in a low Retort with a smart fire, the sulphur of the *Cinnabar* will fasten upon the filings, and let the *Mercury* come over faire and vivid, and perhaps somewhat impregnated with a martial vertue, upon whose score it may be better than if it had been prepared by meer Depuration.

2. And this leads me, to the mention of another way of diversifying *Mercury*, which is by *Impregnation*, either Corporeall, or Spirituall (if for distinction sake I may so call them.) But the *Impregnation* being a comprehensive way, divers particular methods may, after a manner, be referr'd to it: yet because the true grounds of such references are sometimes hard enough to be assign'd, at least in few words, I shall allow my selfe without scrupulously regarding them to proceed in my free observations.

3. The next thing then upon whose account a *Running Mercury* may come to differ from *Common Quicksilver*, is a spiritual *Impregnation*. By *Mercury Spiritually Impregnated*, I meane that
with

with which some subtle parts of another body are so intimately associated and united, that not only the additament will pass with the *Mercury*, when it is strain'd through *Leather*, (though that be the means by which Artists usually separate *Gold* it selfe from the *Mercury* wherewith it has been Amalgam'd) but will also continue with it after distillation, without hindering the *Mercury* from being vivid enough. I know there are many Chymists, especially, among the more cautious, that looke upon *Quicksilver* as so Heteroclite a Minerall, that as no Body can fasten enough upon it, to alter it intrinsecally; so it will not admit any other Body to be associated with it any thing intimately, or permanently. And indeed since we find that when *Gold* it selfe, with which of all bodies whatsoever *Mercury* is beleev'd to have the greatest sympathy, may yet be separated from it by straining an *Amalgame* of those two metals through *Leather*, which will transmit the *Quicksilver*, and retaine the *Gold*; and if such an *Amalgame* be distill'd with a competent fire,

fire, the *Mercury* will ascend, and leave all the *Gold* behind in the Retort; since *Mercury* I say, is so separable from *Gold* it selfe, it may seem improbable, that it should be more intimately associated with any other bodies: but these arguments, though specious, do not I confesse convince me, who must not deny, but that the Corpuscles of some minerall Bodies may be so well commixt with *Quicksilver*, as to pass with it through the Pores of Leather, and who have found by tryall purposely made (and elsewhere related) that *Quicksilver* being in a convenient proportion Amalgam'd with *Tinn*, or with *Lead*, and distill'd with a competent fire, will manifestly bring over with it some of the associated metall, inso-much that not only I have found a notable increase in the weight of the distill'd *Quicksilver*, but it would both leave a taile, as they call it, behind it, when it moved upon a sloping glass, and (which was more) when the sluggish *Mercury* had rested a while, it would appeare covered over, with a kind of scum, made of the
Emerging

Emerging Corpuscles of the *Tin*, or *Lead*, either of which, especially the former, is a metall lighter in *specie* than *Quicksilver*. Hence it appeares, that *Mercury* may be so strictly united to a not despicable proportion of a gross and ponderous body, and of an ignobler kind as to carry it along with it selfe in distillation, which by this appeares not to be near so certain a way, as some learned Chymists think it, to try whether *Mercury* be pure in all adulterating mixtures, and to free it from them, if it had any before. But the chiefe use I will make of this Experiment is this, that since we see that sometimes *Mercury* do's not refuse even corporal Impregnations, (as for distinction sake I call those lately recited) it ought not to appeare incredible, that it may in some cases admit spirituall Impregnations, and so intimately associate with it selfe some of the finer parts of certaine metalls and mineralls, as not to part with them, though they be distill'd, and afterwards perhaps severall times wash'd. This brings into my mind, that I had once a distill'd

still'd *Mercury* made by an Impregnation of common *Mercury*, a drope or Globule of which, being evaporated from a thin piece of Silver, not only seem'd to have somewhat penetrated it, but (as I expected) left upon it a rugged substance apparently lighter than the surface of the piece, and of a colour very neare that of *Gold*, from whose nature perhaps it was very remote: but that common *Mercury* may indeed be spirituallly impregnated, I have been perswaded by divers effects, that I have tryed of such Impregnations, and I acknowledge to you, that most of the uncommon *Mercuries*, that I am now proceeding to tell you of, have been prepar'd after some such manner.

4. Another thing, wherein a *Mercury* may differ from common *Quicksilver*, is a facility to *Amalgame* with *Gold*: for 'tis known to Guilders, Goldsmiths, and others, that are vers'd in such Experiments, that to make *Amalgams* with *Gold* and *Mercury*,

cury, 'tis usuall enough to take six parts of the latter to one of the former, and some take eight or more. Nor is so great a proportion of *Mercury* wont to keep them from thinking it requisite to make both it and the *Gold* separably, and considerably hot to facilitate their commixture, but I have divers times had spiritually impregnated *Mercuries* with but two parts, of which I would presently make an Amalgame with one part of the *Calx*, or leaves of *Gold*, and that without any other externall heat, than that of the palme of my Hand. Nay sometimes for tryall sake, I have employed but one part of *Quicksilver* to make in the palme of my Hand a mixture, wherein the *Gold* was so far from appearing, that the colour of the *Quicksilver* was not sensibly so much as impair'd.

5. Another difference between some *Mercuries* and those that are vulgar, is, that these being put to *Calx* of *Gold*, though one do at length bring them to mix, (for it is not so easily done as men are wont to presume)

yet

yet they will not disclose any sensible heat, but the mixture, as each of the incorporated Ingredients was, will to the touch be cold: but though I know there are many learned Chymists that looke upon incalescent *Mercuries*, that is, such as will grow hot upon their mixing with *Gold*, as Chymical *non-entia*, or Chymists's, yet they are not competent Judges of the possibility of things. For I have more than once, or a few times, both alone, and in the presence of some curious persons, found and evinc'd, that a distill'd *Mercury* may be so animated, that a single drachm of it, or perhaps a far less quantity, being mix'd barely with my finger, with as much, or perchance halfe as much, *Calx of Gold*, would presently conceive, not only a sensible, but a very considerable heat: insomuch that sometimes it would prove offensive to the palme of my Hand, wherein I made the mixture. Divers *Phænomena* of this Experiment may be seen in the Authors little Tract of the incalescence of *Quicksilver* with *Gold*, now extant in the *Philosophical Transactions*. Numb. 122. And I re-

member that once being to convince a very eminent Chymist, that there were such *Mercuries* as I have been speaking of, I took a remnant of a certaine *Quicksilver*, which I intend never to make againe, (and of which for the sake of Mankind, I resolve not to teach the preparation) of whose disposition to incalescence I had such an opinion, that though we had no *Calx*, nor so much as filings of *Gold*, but only such pieces as he could grossly prepare with a hammer and a paire of sissers, I ventured to put my Mercury to them in a glass Mortar, and yet notwithstanding the thickness and closeness of the beaten metall, and the coldness of the Vessell, the Mercury to the Artists wonder penetrated the *Gold*, and grew manifestly hot with it. And this faculty of our *Quicksilver* was not a transient and easily vanishing one, for I had already kept the Mercury by me, for severall years. The *incalescent Mercuries* hitherto mentioned were animated by tedious, and laborious operations, but if I had desired only to convince gaine-sayers, I could have
done

done it by a very much shorter way : for though this sort of impregnated *Mercury's* be many degrees inferiour to the forementioned animated *Mercuries* ; yet as to incallescence with *Gold* I know by experience a way which is indeed hard to hit , and requires a dexterous Artist, but which, when it succeeds a right, will in an hour, and perhaps a less time, qualify *Mercury* to grow presently hot with *Gold*.

6. When an Animated *Mercury* is by due Impregnation qualified to Amalgamate readily and intimately with *Gold*, and penetrated so as presently to grow hot with it, it is not much to be admir'd, that it should also differ from common *Mercury*, in the being able to carry up with it part of the *Gold* wherewith it was so strictly associated. I know that many learned Men, and among them divers Chymists themselves, do not thinke it credible, that at least Corporall *Gold* should be volatilized by *Quick-silver*. And indeed that which is common may be many times distill'd from

Gold, without carrying up any of it; but this ought not to conclude against such spiritually impregnated *Mercuries*, as I lately mention'd: for with a very small quantity of one of them I have sometimes elevated so much *Calx* of Gold, that the inside and necke of the Retort were richly guilt by the adherent particles of that metall, which would sometimes sticke so close, as not to be without difficulty separated from the glass; and I remember too, that having with one of these noble *Mercuries* Amalgam'd about halfe its weight at most (if I mistake not) of *Calx* of Gold, though it did not guilt the inside of the glass, yet I found as I expected, that the distill'd Mercury was manifestly encreas'd in weight, as well as somewhat chang'd in colour and consistence; which Experiment may be added to those, that I formerly mention'd, to prove that *Quicksilver* (duely prepar'd) may be corporally impregnated.

7. In the *Amalgames* made of one of these spiritually impregnated *Mercuries* with *Calx* of Gold, I have sometimes

times observ'd a thing, that argues such Mercuries to be differing from common *Quicksilver*: of whose *Amalgames* with Gold such an effect has never (that I know) been taken notice of. The *Phænomenon* I meane was this, That by distilling one of those subtle *Amalgames* in a Retort, a good part of the bottom of the Vessell, which I have yet by me, was left adorned with a very lovely colour, almost like that of *Turrois* Stone, inclining towards the colour of Gold, and somewhat changeable, and also so closely fastned to the Glass, that it seems to have penetrated into it, though this beautifull stain were left by but a very small quantity of the *Amalgame*, and though this mixture were distill'd but in a moderate fire, since 'twas in a sand furnace. Nor is this the only Experiment of this kind, that I would alledge, since I elsewhere mention an *Amalgame* of Gold with an animated *Mercury*, which being long decocted, when at length by an excessive fire unskillfully administred the vessell was unluckily broken, left the lower part of the glass permanently ting'd with a

pure and transparent red, that seem'd to me to emulate that of a not common *Rubie*.

8. Another difference I found between ordinary *Quicksilver* and spiri-
tually impregnated *Mercuries*, that
will perhaps somewhat surprize you.
And it is, that though one would ex-
pect that *Amalgames* made with *Mer-
curies* so penetrant and so dispos'd to
adhere closely to *Gold*, should make
with it *Amalgames* far more easy than
those made with ordinary *Quicksilver*
to be turn'd into red Precipitate, yet
I found the quite contrary upon try-
all. For whereas Chymists are wont
to mention about six weekes as the
usuall time, wherein *Mercury* may be
precipitated even *per se*, that is, with-
out additament, and allow but a shor-
ter time to make this precipitation,
when 'tis Amalgam'd with *Gold*,
(whereby some of it is detain'd, and
all more expos'd to the action of
the fire) I have had the Curiosity to
keep an animated *Mercury* Amal-
gam'd with about a third part of its
weight of fine *Gold* above twice six
weekes,

weekes, without having so much as a graine or two of precipitate (perhaps not halfe so much) that I could perceive, though the *Mercury* grew hot with the *Gold* at their being mingled, and though the mixture were purposely kept in a good heat capable to make *Quicksilver* circulate; nor did I content my selfe with one tryall, nor with one sort of animated *Mercury*; but in above five or six months I obtained not one graine (that I could discerne) of Precipitate, though the heat was so strong, as to carry up many parts of the *Quicksilver* and of the *Gold* with it, to the top of the glasses; nay in one of them (which was a somewhat odd case) the fire was so violent, that the *Hermetically* seal'd glasses beginning to melt, the spirituous matter included in it was so forcibly expanded, as to stretch the weaker side of the glass, and give it as it were a bunch, yet without breaking it, as I can shew you in the glass it selfe, that I have yet entire by me. Nor do six months make the longest terme, that the obstinacy of my curiosity has made me keep *Gold*

in decoction with animated *Mercuries*, without obtaining a red powder or *Precipitate*, though in the meane time there were produc'd very pretty vegetations, and sometimes, which is far more considerable, odd changes of colours, about which it is not here necessary to entertaine you. The maine drift of this observation being to give you notice, that as far as I have yet tryed, the more subtle and richly impregnated *Mercuries* are far less apt to afford *Precipitates* with *Gold* than common *Quicksilver* is. As if that disposition to be calcin'd, (as the Chymists are pleased to speake) or turn'd into powder, required the presence of the recrementitious or more separable part of *Quicksilver*, that a Chymist would perhaps call it *Sulphur*, which was a discovery I could willingly enough have miss'd. For I confess I had some hope, as well as intention, to try whether a *Precipitate* made with *Gold* and some of these noble and richly impregnated *Mercuries* would not prove a nobler medicine than *Precipitates* made with *Gold*, and only common *Mercury*:
though

though even of some of these, when dexterously prepar'd and kept their due time in decoction, experience invited me to have no slight opinion, especially, if they be exhibited in a just dose, and accompanied with a proper additament, by which they may be kept from raising any salivation, and have their operation either altogether or almost totally determin'd downwards.

9. The last difference I shall observe between some distill'd *Mercuries* and common *Quicksilver*, shall be their *Inequality in point of specifick gravity*. I know you will thinke this a Paradox, but I can tell you, that I had once the opportunity to examine *Hydrostatically* a noble *Mercury*, for the impregnating whereof neither corporall *Gold* nor *Silver* was employ'd, and yet having carefully weigh'd this *Quicksilver* in water, according to the method I elsewhere teach, in the presence of a famous and very heedfull *Virtuoso*, I found it, as I had foretold, not only manifestly, but very considerably heavier in *Specie*
(that

(that is, *bulke for bulke*) than common *Quicksilver* , though this *Mercury* had been severall times distill'd, and by other waies depurated, which to me seem'd to argue, that even spirituall or volatile *Gold* (for no visible *Gold* was employ'd, and no metall but *Gold* is so heavy as *Quicksilver*) is able to increase the specifick gravity of *Mercury* it selfe, which of all the Bodies we know, is exceeded or equal'd in that quality but by one alone ; and the ponderousness of our lately mentioned *Mercury* seems to me the more wonderfull, because having by the same method *Hydrostatically* examin'd a *Mercury*, made after a strange way , (without common *Mercury*) I found it scarce at all to differ in gravity from common *Quicksilver* , since it did not weigh full fourteen times as much as common water of the same bulke.

But here I shall observe to you upon the by, that 'tis not a certaine consequence, to infer, that the heavier the *Mercury* is, the more fixt it must be: for I remember that having been once
so

so unadvise'd as to comply with the earnest solicitations of an inquisitive Gentleman, that afterward behaved himselfe very ungratefully and unworthily to me, I gave him instructions how to make an animated Mercury, which I look'd upon as very much of the like nature to the ponderous one, I have been speaking of, but less tedious, and far less difficult to be prepar'd, and whiles he found, he needed my renewed directions according as new difficulties occur'd to him, he gave me from time to time an account of his progress, and when he was advanc'd far in the process, he inform'd me, amongst other things, that following my direction in purifying and animating his *Quicksilver*, he found it so alter'd and subtiliz'd, that he would distill it in less than halfe the time he had formerly employ'd to drive it over, with the like fire and vessells.

This is what I thought fit to say at present, about the differences between common *Quicksilver* and prepar'd (but yet running) *Mercuries*.
And

And yet I am content to add two or three advertisements, for which, and especially for the first of them, you will perhaps thanke me, if ever you should vigorously prosecute in a Spagiricall way, the more noble sort of Mercuriall Experiments.

In the first place then, I shall observe to you, that whatever some learned Chymists, and others reach to the contrary, it is matter of fact, that *Mercuries* may be animated or spiritually impregnated by more waies than one, (not to say, by more than a few) so as to penetrate *Gold* very powerfully, and grow hot with it; and it seems to me very probable, upon grounds not meerly notionall, that the differing wayes that are employ'd to prepare these animated *Mercuries*, by impregnating them with this, or that Minerall, or metall, may much diversify their qualities and operations, according to the respective natures of the bodies they are impregnated with. Nay though there seem so great a distance between *Quicksilver* and vegetable substances,

yet

yet I have seen a Mercury, that was prepar'd by the help of Vegetables without metalls or mineralls, which was very different from common *Quicksilver*, by being more noble than it.

The second thing I am to acquaint you with, is, that as divers bodies and methods may be employ'd in the preparation of noble *Mercuries*, (as I have newly observ'd,) so it seems very probable, that the common *Mercuries* so prepar'd may have differing, as well as noble qualities and uses, not only in respect of *Alchemy*, but of *Medicine*; as being fitted to have potent operations, as well upon humane bodies, as the more stubborn ones of Metalls and Mineralls. I am not indeed at all forward to recommend the needless use of Mercuriall Medicines, of which we may too often see bad effects, if they be not as well prudently and cautiously given, as faithfully and skilfully prepar'd: but since we see that in spite of *Hellmont*, very many learned and experienced Physitians allow themselves to employ, frequently enough, even
the

the vulgar preparations of common Mercury, some of which prove indeed oftentimes in some stubborn diseases far more efficacious than ordinary medicines, I see not why we may not hope for greater and more innocent effects from a Mercury well purified and impregnated with the Sulphur and finer parts of such bodies, as volatile Gold, or Venus, or Mars, or Antimony &c. And though, as I lately told you, I found such animated Mercuries far more indisposed than common Quicksilver, to make a Precipitate with Corporall Gold, yet this need not hinder, but that divers other preparations may be made, as well with impregnated, as with vulgar Mercury: such as are Turbith Minerall, the white Precipitate that purges downwards, Mercurius dulcis, Pills of Crude Mercury made up with fit ingredients, (as in those that are by some called the blew and the blacke Pill) and especially the Cinnabar made by subliming Quicksilver and Sulphur, into a purely red substance, which though wont to be employed chiefly by Painters, ought not perhaps to be
negle-

neglected by Physicians, since even in ordinary *Cinnabar* the vulgar *Mercury* is so bridled by the common *Sulphur*, that unless too frequently given without pauses, or in an indiscreet dose, it has not been usually found to salivate, yet does often lye not idle nor useless in the body; so that it may bee well worth trying, whether a noble *Cinnabar* may nor be obtained by substituting animated *Mercury* for vulgar, especially if instead of common *Sulphur* one should employ that of *Antimony*, or of *Antimony* and *Vitriol*, which I have elsewhere shewn to make.

The third and last advertisement I will give you, shall be, that you are not hastily to conclude, that a *Mercury* that has been carefully depurated and impregnated, has not been well prepar'd, if you find it not readily to elevate corporall *Gold*, as it may seem by the past discourse that most of the animated *Mercury's* I have mention'd did. For though it be true, that I have had some *Mercuries* fitted to penetrate *Gold* so far, and mix with it so closely, that

that it would quickly upon distillation visibly carry up some of that ponderous metall with it, yet so much is not to be expected from all *Mercuries* that may lay claim to the title of *Animated* or *Noble*. For I have found that some even of these, may require a strong decoction to incorporate them intimately with *Gold*; and I remember that once for tryalls sake I made *Mercury*, which upon bare distillation would not at all colour the glass; I made (I say) this *Mercury*, by decocting or circulating it with the *Gold* for ten dayes or a fortnight, unite so closely with the metall, that it would afterwards elevate enough of it to guild the inside of the glass; and by a much longer decoction I have sometimes had the *Gold* lodg'd copiously in the upper part, and even in the necke of considerably tall Glass Eggs, *Hermetically* seal'd, one or two of which I can yet shew you.

The



The V. Part.

Of the Producibleness of Phlegme or water.

OF the severall substances that Chymists obtaine by the fire from mixt bodies, that which they call *Phlegme* or *Water*, and would have Men looke upon as *meer Water*, separated by a preceding *Analysis*, seems to the *Helmontians*, and diverse other modern Artists, to bid the fairest for the Title of *Elementary* and *Primordially*. Wherefore it will now be fit to consider, whether, about that also, we may not justly retaine some doubts, and rationally suspect, that all that they call the *phlegme* of body's, was not in the forme of *Elementary* simple water, preexistent in the body, whence 'tis obtain'd: but that even
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such portions of matter, as many of those that pass among Chymists for *Phlegmes*, may be produc'd either by the operation of the fire, or by other wayes.

In order to the enquiry, it will be fit to premise something against the presum'd simplicity and Homogeneity of the liquors, whereto the Spagirists give, in common, the Name of *Phlegm*; that in case some of the produced liquors we speake of shall be deny'd to be precisely of an Elementary nature, it may appeare that that ought not to hinder us from allowing them the name of *Phlegm*, provided that they be not remoter from simplicity, than those to which Chymists grant that Appellation.

And first, I consider, that besides those Quality's that are common with water to diverse other liquors confessedly not simple, as transparency, want of colour, apiness to be imbibed by most sorts of Vegetable and Animall Substances: the two Qualities, upon whose account Chymists are wont

to call a body *Phlegme* or *Water*, are, it's appearing to them Insipid, and its being of a Volatile and fugitive nature.

I further consider, that not only divers of those liquors that pass for *Phlegme*, will yeild a taste sensible enough to him that will hold them with attention of mind, for a competent time, in his mouth, but that the *Criterion* of liquors by the Taste is nothing near so certaine as many thinke: For, not to mention, that 'tis plaine, that some kinds of doggs, as Setters, Spaniells, and Blood-hounds take notice of many things by their odours, that we Men have no perception of by our smelling, which may argue, that our Senses may not be moved with objects that would affect them, if they were of a more delicate contexture; not to mention this (I say) 'tis plaine that the subtlety of the sence of tasting differs among Men themselves. And those that drinke nothing but water, will often tell us of a great Disparity betwixt common water, wherein other Men find not

any. And I remember, that when once I did, though but for some Months, confine my selfe to drinke water, I could distinguish the Limpid waters of differing places, almost as manifestly as I now distinguish Beeres, which after I fell againe to drinke Wine and other liquors, I ceas'd to be able to do.

The Consideration of *Quicksilver* may, methinks, let us see, that 'tis possible for a gross and fluid body, that is far from Elementary *Water*, to be inspid. For *Quicksilver* is without question a fluid, and at least in reference to some bodies, *Gold*, *Silver*, and some others, a liquor; since it soaks into their pores, and softens the bodies. The same *Quicksilver* may also serve to shew, by its disposition to fly away in the fire, that Volatility, even in conjunction with inspidness, is no certaine mark of an Elementary or simple, nor consequently of a Primordial body. And indeed since Volatility depends mainly upon the extraordinary minuteness of the particles whereof a body consists, and

and on their being incoherent, and of shapes fitted for Motion; this quality may be acquired by so many differing wayes, and be found in bodies otherwise of such differing Natures, that unless it be found associated with the other qualities proper to *Phlegme*, it will be but an unsure Argument, to prove the body that it belongs to, to be Elementary, and not to have been by composition, division, or transposition produced.

If it be true as the *Cartesians* will have it, that *water* consists of particles, that like little *Eeles* are long and extremely slender, and consequently flexible; I see not any possibility, that the various action of the fire, upon the Minute parts of a body, and that which it may cause, the corpuscles of one body to have upon those of another, may produce *water*, that did not in the form of *water* preexist in the body that affords it: for it seems to me possible enough, that the particles whereof a corporeal Mass is made up, may have

such shapes, Sizes, & contextures, that by the various agitation which the parvading corpuscles of the fire may produce amongst them, whatever edges and points they had before, may by mutual attrition of the Corpuscles be worn off, and by the same means, so much of the substance may be worn away, that what remaines, cannot but be very flexible, and by all these qualifications become fit to make a particle of water. As a bar of Iron may by divers strokes of the wedge and Hammer skilfully employ'd, be divided into longe and slender parts, whose edges and points being blunted, they may be reduced into slender, and every way flexible Wires. But not to build on speculations, let us proceed to some experiments, which afford *Phænomena* that seem favourable to our *Hypothesis*.

Amongst the bodies about which Chymistry is conversant, those that seem to be the most indispos'd to be turned into water, are the Metalline, and Mineralls ones: so that if it can be made appear, that any of this sort can

can be changed , into an Aqueous liquor, twill make it highly probable, that Aqueous Liquors may be .by Chymical operations *produced*, especially in vegetable and Animal bodies, which seem far more susceptible of such a change , than the stubborne subjects of the Mineral Kingdome. And since *Quicksilver* is by many learned Men, as well Chymists as others, lookt upon as one of the few most indestructible bodies in Nature, and by its great ponderousness, in which it exceed's all the known bodies of the world save one , is so much the more remote from such a liquor as *water* , that has not the sixteenth part of its specifick weight; If *Quicksilver* it selfe can in great part be turned into an Aqueous liquor, it will not a little favour the Doctrine proposed in these Notes ; for which reason I shall subjoyn the ensuing story.

Relating to a very ingenious and sober Physician of my Acquaintance what had befallen me in distilling *Mercury*, from whence I once obtain'd a *water* without additament, without

being able to make the like Experiment afterwards succeed, he assured me that he and a friend of his, had some years past provided a very large *Dutch* Retort of good Earth, furnished with a Pipe of about a foot long, to cast in the *Mercury* at, and that having by little and little conveyed through that pipe a pound of *Quick-silver* into the candent Retort, they obtained four ounces of *Water*, and lost in spite of their care two ounces of matter (whatever it were,) the remaining part of the pound having been elevated in the forme of *Mercury*. And when I suggested, that perhaps the *Water* that came over was afforded by the aqueous particles of the Earthen Retort it selfe, he replied, that, to prevent their being imposed on, they had been carefull not to put on the Receiver, till the Retort had been made thoroughly glowing hot, and that this liquor was far from common *Water*, he thought to be past doubt, by that which follows. For I having acquainted him with an odd tryall or two, I had made with *Mercuriall Water*, and asked him, whe-

whether he found the like effects from his, he told me, that his friend and he poured both their distilled *Mercury* and their *Water* into a kind of *China* cup, and though it were in *June*, left it open in a Garret for two or three dayes, upon a Presumption his friend had that this Mercuriall *Water* thus ordered would turne a good part of the *Quicksilver* into it's own nature, and so multiply it selfe upon it. But when they came to visit their Cup againe, they were much surprized to find their *Water* all gone, and that the greatest part thereof was turn'd againe into *Mercury*, which they concluded from this, that they miss'd upon the ballance but about halfe an ounce of the whole matter; which (halfe ounce) they supposed to have been lost by evaporation; the other three ounces and a halfe being found in the encreased weight of the *Mercury*.

The mention I have made of *Quicksilver*, puts me in mind of an Argument *ad hominem*, that may deserve to be considered, by the chiefe sect
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of modern Chymists, the *Helmontians* for if it be true which their master teaches, that by his *Liquor Alkabeſt*, not only *Quicksilver*, but all other tangible bodies, may be reduc'd into insipid *Water*, just like *Rain Water*, I may be allowed to infer, that *Water* may be produc'd, since salt and Sulphur themselves may be turned into *Water*. I know the *Helmontians* may answer, that this is not so much a production, as a reduction, since all things consisting originally of *water*, the *Alkabeſt* does but deprive it of the disguises, that seminal Principles put it into, to make it appear, under the form of *Gold*, *Quicksilver*, *Plants*, *Animals* &c. But this Answer may be elsewhere further examined: for the present, it may perhaps be sufficient to reply, that even by this Answer 'tis granted to appear by Experiment, that *water* has been copiously produc'd out of Mineral bodies, but it has not yet been made appear, that those bodies were produc'd out of *water*.

But this is not all, nor perhaps the Prin-

Principall thing I have to say in favour of the opinion pleaded for in these Notes. For supposing bodies by being reduc'd, by the *Alkabeſt* and the fire, into an insipid Liquor, were really reduc'd into *water*, yet the *Helmontians* would not fully satisfy me. For *Helmont* relates, that by abstracting his immortal Liquor from stones, or such kinds of bodies, he turns them into salt equiponderant to the Concrete; which Salt by further operations he reduces, as he supposes, into Elementary water. Since then he stops not at salt, but goes to a further transmutation, and concludes, that a Stone doth not consist of salt, because that salt may, by further operations, be turned into insipid *water*; he must give me leave, on the same ground to argue, that insipid *water* is not the first matter of bodies, since by a further operation of the fire, that liquor it selfe may be, at least in great part, turned into *Earth*. For I elsewhere relate some Experiments of my own and a friends, in which cleare *water*, divers times very slowly distilled out of clear glass bodies, left every time

a terrestriall powder at the bottom: as if (in case *water* be so *Homogeneous* a substance as is supposed,) the whole body of the *water* might, by reiterated Distillations, without violence of the fire, be reduced into *Earth*; whereof I remember in the last tryall of mine, I had enough to cover the bottom of a large Cucurbit, out of which the Distillations had been made.

And on this occasion, I shall add a Tryall, which seems to argue, that without the help of often repeated distillations in tall Cucurbites, cleare *water* it selfe may, by the operation of the fire, be chang'd into another Body.

We tooke then very pure and limpid *water*, which had by our *Pneumatick* Engine been carefully freed from the Aeriall particles, that are wont to be harboured in the Pores of that liquor: This in a new bolt-head of such a size, that the matter might have roome to play and circulate, we seal'd up *Hermetically*, and placing

placing the vessell in a digestive Furnace, we left it there above a yeare, and observ'd, as we expected, that after it had continued for a good while, there began to forme themselves in the water little concretions heavier than it, which in process of time encreased in magnitude, and, as we thought, in number, making a kind of *Terra foliata*, that consisted of a multitude of little thin filmes or scales, (like those of the smaller sort of Fishes) which, when the glass was shaken in an enlightned place, were copiously dispers'd through the body of the Liquor, and appear'd variously and vividly colour'd, being some of them almost as big, as spangles, and more glittering; and when the agitation ceas'd, they presently fell to the bottom, which they cover'd in the forme of a *Terra Foliata*; by their subsidence manifesting themselves to be notably heavier in *specie* than the water they had been form'd of. And the longer the glass was kept in the digestive Furnace, the more of this fine Terrestriall substance was produc'd: And least the effect should be ascribed

ascribed to the abstraction of the *Air* from the *water*; handled as is before related, I shall add, that we produce the like substance, though, as it seem'd, not so copiously, after the like manner, in *Water*, that had not at all been freed from *Aire*.

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The VI. Part.

Of the Producibleness of Earth.

OF all the substances obtainable from mixt bodies, that which to Persons preposses'd with *Helmontian* opinions may seem the most simple, elementary, and unchangeable, is, that which they call *Earth* or *Terra damnata*: because there is suppos'd to be no doubt, but that the calcining or incinerating violence of the fire must not only have driven away the Mercurial and other volatile parts, but must also have quite burnt out the Sulphurs, which ofentimes are more fixt than the rest; as the water on the other side must have dissolv'd away all the *Alkali* or fixt salt.

This Ratiocination I confess, is very specious and probable; but yet not so satisfactory, but that a Sceptick may retaine not irrationall doubts about

bout the cogency of it, upon such considerations as I am now going to propose.

And I will begin with considering, that, whereas the things wherein this suppos'd simplicity, and unchangeableness of the Earthy part of mixt Bodies, is founded, are these Three: its not dissolving in water; its not affecting the Taste; and its not having flowne away from the incinerated body, that afforded it; it may with probability be doubted, whether any of these or all of them put together, do necessarily evince what Chymists pretend they do.

And in the *first* place according to the different constitutions of certain sorts of bodies, I thinke it fit to make a distinction between the dry and heavy parts, that remaine after a Body has been expos'd to the violence of the fire, and if need be, freed from its salt as much as it can be, by the affusion of water. For 'tis evident, that in some Bodies, especially of a Metalline nature, the fire, that makes
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that which they call calcination, do's not operate as it do's in the burning of Vegetables. For, besides that sometimes almost (and sometimes more than almost) the whole weight of a minerall is to be found in that which they call it's *Calx*, and is manifest in the Calcination of *Lead* and *Tinn per se* (if skilfully perform'd,) the *Calx* is in great part reducible sometimes into a body of the same nature with that which afforded it, and sometimes into some other Body, very far from being Elementary: as is manifest partly in the reduction of *Minium*, (which is *Calx of Lead* made *per se*) which, as to the greatest part of it, we have more than once, by the bare way of ordering the fire, reduc'd in a very short time, and without additaments, into malleable *Lead*; and partly in the *Calces* or (as they also speake) *Ashes* of *Antimony*, which by bare fusion are easily reduc'd into glass, whence we have sometimes obtain'd an *Antimonial Regulus*. So that 'tis manifest; that there is a great deal of difference, between the *Ashes* (taking that word in a large sence) of *Metalls*, and of

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some Mineralls, where almost the whole Body is by the fire converted into a dry and heavy powder, and the Ashes of incinerated Vegetables, who usually leave but a little quantity of *Earth* behind them, in comparison of the matter which the violence of the fire hath driven away.

But setting aside the above-mention'd Metalline *Calces*, which without question remaine compounded Bodies, if metalls themselves be so; and to forbear examining, whether they be not further compounded with Corpuscles of the fire, or fuel, that are embodied with them: I consider, that the Qualities which make other Ashes pass for Elementary *Earth*, may be produc'd in portions of matter that are not simple, either by composition or change of texture.

I have elsewhere occasion to take notice of Bodies, which though when they are single, they will easily dissolve in water, yet the result of them will not: And you may find instances of this kind, among the *Magisteries*, and Chymist

Chymists call them, made of severall Bodies, by precipitating their solutions (made in acid liquors) with oyle of *Tartar per deliquium*.

From oyle of Vitriol and spirit of Wine, though both most readily dissoluble in water, we have by bare digestion and distillation, obtained a pretty quantity of a substance, that we found not to dissolve in water, and which seemed to be insipid and fixt enough.

There are Stones, some more and some less pretious which though I could by the help of the fire deprive of their colour, and bring to a white powder, yet it did not appeare to me, that they were really calcin'd, or would in water yeild any salt: so that if these Stones be compounded bodies, as Spagirists tell us they are, we see that there may be other Corpuscles besides metalline ones, which though reduc'd by the help of the fire to a white powder insipid and not dissoluble in water, are yet remote enough from an Elementary nature.

But I need seek no further, for instances of this kind, since Spagirists themselves teach us, that the Ashes of Wood may by the Violence of the fire, be turn'd into glass; which being a body compos'd of the Earthy and Saline part of the Ashes (for they tell us, that *Earth* separated from the Salt will never be vitrified) must be according to their own confession a compounded Body: which being at last made by the utmost violence of the fire, must be fix'd, indissoluble in water, and consequently insipid. And without taking this Vitrification upon the Chymists authority, 'tis manifest, that in glass made the common way, there is a great deal of *Borellia*, *Sal-Alkali*, or other Lixivate Salt mixt with the Sand: as is evident, not only because Artificers find the salt needfull to dissolve the Sand, and bring it to fusion, but because the Glass uses to weigh very much more, sometimes (as an Ingenious Master of a Glass-House answered me) thirty, or forty pound in an hundred, than the Sand that was put in.

I shall add, that, since Chymists ascribe all *Odours* to Sulphur, I may reasonably conclude against them, that in spite of all the violent fire, which is required to the making common glass, there is store of Sulphur, as well as salt in it. For I have often tryed that by barely rubbing two large pieces of glass, one against another, there would quickly be produc'd a strong offensive smell. And yet Glass which thus appears to be not only a Compounded, but a Decomposed Body, since the Sand or *Cugali* (as the *Venetian* Glasmens call their Pebbles) or other Stones being themselves mixt Bodies, are further compounded with the Salts that dissolve them: *Glass*, I say, is a Body that manifestly possesses all these three qualities, which Chymists require in their *Earth*, being tasteless, indissoluble in the Water, and fixed in the fire. And if Ashes alone be (as Chymists teach us they are) capable of vitrification (and indeed an inquisitive Owner of a Glass-House answered me, that once, if he much misremembred not, made, but not easily

sily, glass of Ashes alone without Sand;) how are we sure but that in common Ashes, freed the common way, from their fixt salt, that which is called the simple *Earth*, may not be a body compounded of two or more substances, which by their coalition, and new Texture produc'd by the action of the fire, have been brought to a kind of Vitrification, or otherwise have acquired the few obvious Qualities. that Chymists are wont to thinke sufficient to give a Production of the fire, the name of *Earth*.

Tis obvious to observe, that divers Bodies, when they come to be of sensible bulke, will sinke in Liquors, in which their Corpuscles would freely swim, if so many of them did not sticke together. As of Salt and Sugar, the Lumps, and even the graines, whiles they remaine such, will fall to the bottom of Water, in which when they are dispers'd into minute and invisible Corpuscles, they will easily swim. And I have observ'd,

observ'd, that in stop'd glasses some Salts, and other Bodies, that for many Months remain'd undistinguish'd in the Liquors that harbour'd them, would in tract of time, have Conventions made of their Particles, that would then subside, and be no more carry'd up and down by the particles of the Liquor. And I see no impossibility, that somewhat of this kind may happen to the particles, whereof water consists: for if some of these, by frequent occursions and Attritions come to apply themselves to one another, so as to have a fuller, and more immediate contact than formerly, and to be intangled among themselves, and perhaps also to exclude some very thin and subtile Aire, that may be suspected to lurke about them, and contribute to their sustentation; if I say, this Union or strict Adhesion of Aqueous Corpuscles, shall happen to be made, the Aggregates or Clusters, though as to sense, but very small, may be too great and unweildy to be any longer, parts of water, but may subside in that Liquor; and if their Union or Adhesion be strict enough,

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enough, they will upon the same account be unfit to be carryed up in the forme of Vapours, and exhalations by Heat, and so may be like *Earth*, fix'd in the Fire, as well as not dissoluble in water.

I have sometimes also had a suspicion, that the production of an Earthy substance in water, may be furthered by the particles of fire, that are employ'd to make it circulate; and that of those Igneous particles, which, as I am apt to think, pervade the glass, some of the grosser, or rather the less subtile, may in their passage fasten themselves to some aqueous particles, fitted to adhere to them, and may with these begin to make some invisible Concretions, to which afterwards other congruous particles may little by little sticke in their passage, and so at length compose sensible Aggregates of powder: which may be illustrated by what happens in the precipitation of *Quick-silver* without addition, where the Mercurial particles being associated by, and probably with some of those
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of the fire, begin to forme Concre-
tions, at first very minute, which af-
terwards encrease more and more, by
the accession of other adhering parti-
cles, till all the *Mercury*, or the grea-
test part of it be reduc'd, from a flu-
id Body to a red powder. And per-
haps it may countenance my Conje-
cture, about the production of an *Ear-
thy* substance, by a briske concurrence
of the particles of fire, if I add, that
though I have kept high rectified spi-
rit of Wine for above a year toge-
ther *Hermetically* seal'd, and for the
most part of that time in a Digestive
Furnace, without finding any *Earthy*
Residence, yet, when I ordered a Bolt-
head, that, though it were *Hermeti-
cally* seal'd, the *Alcool* of Wine that
was put into it might be boiled with-
out breaking the Glass, I found that
in a short time this liquor would af-
ford a not inconsiderable quantity of
such a subsiding Talcky substance, as
I obtain'd from the water formerly
mention'd. But these things I need
propose, but as illustrations that may
somewhat help you, to conceive how
Water may be turn'd into *Earth*. For,
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whether it be by these, or any other waies, that the thing is performed, yet since the Experiment formerly recited, that Water by frequent Cohabitations may be more and more turn'd into *Earth*, argues the matter of fact, our not being able to explicate the manner, does not hinder the thing from being true, nor the Argument we build on it from being good: since even Water, to which by some operations of the fire and the *Alkabeſt*, 'tis pleaded that Bodies are ultimately reduced, may it selfe by a further and very simple operation of the fire be reduced into *Earth*.

I have somewhere mentioned, for I remember not in what Paper I have observed, *Salt-Petre* distill'd with Clay, to lose much more of its weight, than can be suppos'd to have ascended in the forme either of *Spirit* or *Phlegme*. And now to make this Experiment more short and easy, I shall add; that I lately made it in a Crucible, (instead of a Retort) wherein a double weight of finely powdered Tobacco-Pipe Clay, very well

well mixt with pulverized Chryſtalls of *Nitre*, were kept three houres, in a violent fire, and then the mixture being taken out, the remaining fixt ſalt was carefully extracted, but amounted to very little in compariſon of what *Nitre* was wont to yeeld, when calcin'd with Charcoal: and this ſcant proportion of fixt ſalt did not proceed chiefly, from a very copious A volation of Nitrous ſubſtance, appear'd probable by this, that the *Caput Mortuum* was much more ponderous, than was to be expected, upon the ſcore of the Tobacco-Pipe Clay, that was firſt employ'd, and the *Alkali* that was extracted, ſo that the new weight acquired by the Clay, ſeem'd manifeſtly to proceed, from the acceſſion of a portion of the *Salt-Petre*, that by this operation was turned into *Earth*. Inſomuch, that of ſix drachmes that four ounces of Clay had acquir'd, in weight, after the Crucible was taken out, not ſo many graines could even by boyling water be obtain'd from the whole *Caput Mortuum*, which when firſt taken out of the Crucible, was almoſt quite inſipid.

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That Earth may be *de novo* produced, may likewise be probably argued from the Experiment, I formerly related about the destruction of the salt of *Tartar*, by igniting it and putting it into fair Water: for there remained after the numerous filtrations, and if I misremember not, after every one of them, a substance, in the filter, which, for ought appears, may be as well called *Earth* as that which was separated from the calcined *Tartar*, the first time it was put in the water, to divide the salt from the *Earth*. For in our Experiment as well as in the common operation, I come from mentioning, the way of proceeding is the same, and in both their remains in the filter a substance, which by its staying there, shews it was not dissoluble in the water, and which before it came thither, shewed, by its enduring a violent fire, that it was also fixt as *Earth* ought to be. Nor would it much move me, if it should be found, that this factitious *Earth* may have some such operation upon some particular Body, as is not thought to belong to true Elementary *Earth*.

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For since it is obtained by a Chymical *Analysis*, if it have those quality's that in the general estimations of naturalists, make up the notion of what they call *Earth*: I think that ought to suffice us, at least till the Chymists give us some more accurate notion of genuine *Earth*, and shew us such a thing, and teach us a better way of *Analysis*, to obtaine it.

For in many body's that are, without scruple, lookt upon as *Earth*, I observe quality's that do belong to the received notion of Elementary *Earth*. This I say, because I see not why such a Texture as will suffice, to make a portion of matter indissoluble in water, fixt in the fire, and insipid upon the tongue; may not also make it fitt to operate actively upon some Body's, and modify the operations of some others, that act upon it. And if our *Earth* from salt of *Tartar*, be rejected as spurious, they ought to confess the insufficiency of their common way of separating a true *Earth* from the Body's they Analyze: for it seems Calcination and solution in water, and filtration, which make up their

their usuall method, will not suffice to make our *Earth* of *Tartar* pass for true; though it appear not to be near so remote from an Elementary nature, as some other Body's that are obtained from *Earth* by the vulgar *Analysis*. Of which I shall at the close of these notes give an Instance, in well dulcify'd *Quick-lime*, which according to the Doctrine of the Chymists, ought to be an Elementary *Earth*; and yet seems not more so, (if it be so much,) as our *Earth* from salt of *Tartar*. And for the present, I shall add, that the *Caput Mortuum* of *Vitriol* remaining after it had long endured a violent fire, though it were diligently freed from saltiness, by reiterated Ablutions with hot water, was yet far from being an Elementary *Earth*, as appeareth not only by its deep purplish colour, and its ponderousness, far exceeding that of *Earth*, but by a tryal that I purposely made to examine it.

Upon this occasion I remember, that a Learned man of my acquaintance, who visited the Mines of *Hungary* (and dealt much in *Hungarian* *Vitriol*

Vitriol, affirmed to me, when I told him I conceived the *Caput Mortuum* of it to retain much of the Metal-line Nature, that he had upon a certain occasion out of the *Colcobthar* of a certaine sort of *Hungarian* Vitriol, not only received a pretty deal of good Copper, but separated from that Copper, a pretty portion of silver, and some grains of true Gold.

Before I put a Period to there Notes about *Earth*, though my Argument do not need nor require that I should do it, yet upon this faire occasion, I shall here take leave to doubt, whether such an *Elementary Earth*, as the Schooles tell us of, do yet appeare to be more than a Notional thing. For to what I have already said concerning the *Earths* supposed to be produc'd by Chymical *Analyses*, I shall now add, that I have not yet seen it proved, that *Nature* does any more then *Art*, afford us a true *Elementary Earth*; at least I can say, that some, which seem to be of the more simple sort, I found upon examination to have Qualities not ascrib'd

scrib'd to pure *Earth*. For though *Tobacco-pipe Clay* by reason of it's fixity, whiteness, and Insipidness, and it's lying oftentimes deep enough beneath the surface of the ground, may, as probably as almost any other Native *Earth* we know, be look'd upon as *Elementary*, yet *Tobacco-pipes* well baked may sometimes be made to strike fire: and I have more than once tryed, that by briskly rubbing two peices of a new *Tobacco-pipe*, one against another, they would in a Minute or two of an *Houre* grow warme, and being immediately smelt to, manifestly afford a ranke odour, between Sulphureous and bituminous, almost like that which proceeds from *Pebbles* or *Flin's*, when they are likewise rub'd hard against one another. As if *Tobacco-pipe Clay* were not a true *Earth*, but a fine white Sand, consisting of Graines too small to be distinctly taken notice of, like those of other Sand. On which occasion I shall add, that I found by a Hydrostaticall Tryall, that it's specifick gravity was but little differing from that of *Pebbles*, its probable in weight

to water of the same Bulke being as two, and a quarter to one. A Tobacco-pipe may also be somewhat melted by a very vehement fire, (for a less will scarce serve the turne) as may be argued from this, that it may by such a fire be brought to bend.

▽ *Porcellane*, or the matter whereof *China* dishes are made, is not, as some Travellers and Learned Men have fondly imagin'd, a composition that requires to be buried under ground, for I know not how many yeares, to ripen it into *Porcellane*: but as some late Authors informe us, and as I have been assured by a Person, that went purposely to that place in *China*, that is so famous for the making of *Porcellane* vessells, it is a pure sort of Clay, but yet this I find not to be *Elementary Earth*. For besides that I have observed, that a Violent fire will make it somewhat melt; I find that with steel, it will easily enough strike fire almost like a flint. The like I have observed in *Porcellane* very artificially imitated

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with a sort of *English* clay. And I found too, that the matter even of dark colour'd Juggs of the better sort, and well baked, would with a Steel afford sparkes of fire. I forgot to tell you when I was speaking of fine *Porcellane*, that I found its specifick gravity to be very near the same with that of Flints, and Tobacco-Pipe Clay. But I remember I went once to visit a Grove or Pit, where at the depth of divers Yards, they were wont to digg up a certaine white Earth, which distill'd by an acquaintance of mine afforded a Liquor, that was put into my hand to try, and which I found to be very rich in a Volatile Salt, that tasted and smelt much like spirit of Urine, or Harts horne, and had almost the same effects in changing the colours of some Body's, and precipitating of others. I remember too, that I found by the operation of a *Menstruum* or two upon *Tripoli*, that, as white and pure a Virgine Earth as it seem'd, yet it was not *Elementary*: & on the other side a Master of some *English* Mines having presented me, among other Mineralls, which he knew

knew not what to make of a very white substance, whereof he had store, which he thought an *Earth*, and which was judged by an Excellent Artificer, much conversant with *Tripoli*, to be finer even than that *Earth*, I guess'd it upon Examination to be a kinde of *Talcke*, whose leaves were exceeding fine and minute. The Result of these relations may be, not only that we may yet retaine our doubts, whether the Assertors of *Elementary Earth* can shew us any Native substance, that deserves that name: but also, whether those things that remaine after Chymical *Analyses*, though they have all the Qualities that are judged sufficient to denominate a portion of matter *Earth*, may not yet either be compounded Body's or be endowed with Qualities, which belonge not to simple *Earth*. To explaine and confirme which, I shall give an instance in some *Quick-lime*, that I purposely examin'd. For though it had been, by frequent ablutions in warm water, carefully dulcified, and so was as well insipid, as fixt, and indissoluble in water: yet I found, I could

readily dissolve it in divers *Menstruums*, and even in spirit of Vinegar, whereas true *Elementary Earth* ought to be as well indissoluble in such liquors, as in water.

If I had not been to deal with Chymists, but Aristotelians, I might have sav'd my self the labour of solicitously endeavouring to prove, that Earth and water may each of them be produc'd from Body's of a differing nature from it. For though the Peripateticks will not allow *the whole Elements* to have been produc'd, because they looke upon them as integrant parts of the world, which *Aristotle* laboriously (though not solidly) maintaines to be eternal: Yet the *Portions of the Elements*, they will have to be interchangably transmutable. So that what was once water may be Earth, and Earth may by intermediate alterations, be turned into water.

But those I have to do with, being the vulgar Chymists, who will have the material principles or simple ingredients

ingredients of mixt Bodies, coevall with the World, and incapable of being either destroy'd or produc'd; it was not allowable for me to proceed upon the *Aristotelian Hypothesis*, of the transmutableness of what they call Elements, especially because, that though I do admit it, as 'tis, according to my opinion, a part of a more general truth; yet I do not think, they have well prov'd it by their Arguments: which since I my self do not like, I think 'twere disingenious to press them upon others. And without having recourse to their Doctrine, there will occur some other particulars, that may be added to those already mentioned, to countenance the producibleness of the Principles of mixt bodies, in some other papers that are to follow these Notes. Though in strictness I was not oblig'd to say so much, as I have already said, since pretending to call in question no more than the *three Hypostatical Principles of the Chymists*, I might easily have excus'd my selfe, for having let alone the production of *Water* and *Earth*: since the generality of Chymists reckon

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not those Bodys amongst their *Hypostatical Principles*, but looke upon them, as recepticles, or, as others would have them, Recrements of these, or, as on some other account, related to them. But I was not willing to omit *Water* and *Earth*, because some of the more learned of the modern *Spagyrist*s have adoptred them, into the Number of the *Principles* of mixt bodies, and because I finde by experience that in Chymical *Analyses*, they are at least as often to be met with, as some of the *Principles* confessedly Hypostatical. But what has been delivered about *Earth* and *Water*, having much added to the bulke of these Notes: 'tis time I should put a period to this part of them, in reference to which I hope it will be considered, that I do not pretend that every single experiment by me alleg'd, do's sufficiently prove, that the body obtain'd by it, was in the strictest sence produc'd. For if the severall experiments, and other proofes do in conjunction, and as it were in a body, make up a good Argument, that the ingredients they relate to, may be produc'd;

produc'd; 'tis as much as will, I hope, be expected, from these Notes, which having been written by way of Appendix to the *Sceptical Chymist*, may be allow'd, as well as that book, to employ *some* Proofs, not altogether cogent, and may be judg'd not improper, though some of the Arguments propos'd in them to show that *Chymical Principles* are not all ingenerable and indestructible should be but meerly probable. And yet this I shall venture to intimate, that vulgar Chymists and *Aristotelians* may, not perchance, find it so easy a thing, as 'tis like many of them will imagine, confute divers passages of the foregoing Tract, since probably their objections will suppose some thing or other, which though taken for granted among them, and perhaps by several other learned Men, I do not admit as true, or think demonstrable, but rather questionable upon very rational grounds. And though perhaps I should not have brought in some of the Experiments mentioned in the preceeding Notes, if I had not had a mind to throw together what I thought
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might contribute to so usefull a thing, as a *Natural History of Chymical Principles*; on which others, if not I, may hereafter ground a Theory of them; yet this may also deserve to be considered, that if *any* of the foregoing Experiments, though never so few, do really prove, (as 'tis like some of them will be judg'd to do) that *any one* of the Chymical Principles may be, *de novo*, produc'd; that alone will suffice destroy the *Universality* and *intireness* of their *Hypothesis*; and besides give cause to suspect, that by further industry, the Producibleness of other Principles also, may be discovered.

FINIS.